JOURNAL OF ECONOMIC DEVELOPMENT 39
Volume 47, Number 2, June 2022

HOW LONG MICRO AND SMALL ENTERPRISES DO WAIT TO GRADUATE? EMPIRICAL EVIDENCE FROM DURATION ANALYSIS IN ETHIOPIA

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The paper has examined the determinants of graduation of MSEs and tried to estimate the average time required to move from one stage into the next stage (i.e., from micro into small and small to medium level). Using 666 nationally representative MSEs sample data from the World Bank Enterprise pool data collected in 2015, both parametric and semi-parametric duration models are applied to estimate the conditional probability of MSEs graduation. The models used include the full parametric models (the Weibull Proportional Hazard (PH model) and the Lognormal Accelerated Failure Time (AFT model) and the Cox Proportional Hazard (Cox PH) model among the semi-parametric models. A number of interesting findings have emerged. Our findings confirm that percent of manager's time allocated to the enterprise's affairs, managers' experience, business/system improvement, enterprise's location and percent of internal funds/earnings mobilized were found to be positive and significant to increase the likelihood of early graduation of micro or small firms. On the other side, variables, such as degree of competition from informal firms, power supply shortage, land access problem and access to finance from private source increased the graduation duration. It appears that solving power supply shortage and land administration governance is an effective way to increase their graduation. If speedy graduation is desired, then policies should encourage more skill-oriented training about the new innovation and land administration.

Keywords: MSEs Graduation, Duration Model, Hazard Rate, Tigray
JEL Classification: Q57

1. INTRODUCTION

Creating productive jobs and livelihoods for the people who enter the labor force each year is the central challenge in the least developed countries (including Ethiopia)

and developed countries alike. According to the World Development 2013 report on 'Jobs', 200 million people are unemployed in the world, mainly constituted of young and women. Furthermore, by 2020 another 600 million new jobs have to be created in regions such as in Asia and Africa, just to keep employment rates constant. Indeed, the private sector is the main engine of job creation and the source of 9 out of every 10 jobs in the world. Within the private sector, micro and small enterprises (MSEs) account for more than half of all jobs worldwide (Grimm and Paffhausen, 2014). Hence, the subsector is catching the attention of policy makers, both internationally as well as nationally.

Though the link between MSEs and economic wellbeing dates back to the time of Schumpeter (1934), the attitude towards the sub-sector was negative often viewed as inefficient and ineffective, and expected to wither away with economic growth (Lanjouw and Lanjouw, 2001). It was the famous 1972 ILO mission report on unemployment to Kenya that played a historic role in changing the international and national policy debate concerning the MSEs (International Labor Organization, 1972). Since then, the attitude towards the sector started to change as an ever-growing number of scholars, policy-makers, and the international community have begun to examine and uncover the potential of this sector as an engine of growth, poverty reduction, employment generation and private sector development.

In addition to employing the largest number of people in aggregate, MSEs generate the newest jobs (Ayyagari et al., 2011). The sector takes the lion share of fast-growing labor force in the world such as 48 percent in North Africa, 51 percent in Latin America, 65 percent in Asia and 72 percent in Sub-Saharan African countries (Tefera et al., 2013). Particularly, in Africa there were 50 million (more than 1 million in Ethiopia) micro, small and medium enterprises and contribute 58 percent of total employment and 33 percent of the continent's GDP, making them critical for socio-economic growth (Triki and Faye, 2013; Demirgüç-Kunt and Klapper, 2012). However, only 8 percent of their financial need is accessed from banks compared to an average of 11 percent in other developing countries. The situation in Ethiopia is not different, if not worst.

According to African statistical yearbook (2014), there were an estimated 1.4 million new entrants to the job market in 2005 in Ethiopia, and this number will increase to 3.2 million by 2050 due to high population growth (Economic Commission for Africa-ECA, 2014). This persistent increase in labor participation unless complemented with employment access, ultimately leads to chronic unemployment and social distress. In view of this situation, the Ethiopian, MSE subsector is expected to absorb and stand as biggest employment generating sector (next to agriculture) so as to cope up with the current increase in employment demand.

It seems against this backdrop, the Ethiopian government has formulated a National Micro and Small Enterprises Development and Promotion Strategy in 1997, which enlightens a systematic approach to alleviate the problems MSEs are facing and promote its growth. Massive efforts have been made to promote MSEs to the next level (medium enterprises or company level). Moreover, since 2011, the government of Ethiopia had

made a paradigm shift from agriculture dominated economy to industry led economic structure and guided by a five-year growth and transformation plan/GTP (Federal Democratic Republic of Ethiopia, 2016). Accordingly, it is planned that up to 2% (62,500) of the enterprises to graduate from micro to small enterprises and 10,000 enterprises to graduate from small to medium industry and about 100,000 potential entrepreneurs to join the sector during the planning period of GTPII (2016-2020) (Federal Democratic Republic of Ethiopia, 2016). However, in spite of efforts and the focus given to the sector, its share to the economy had remained insignificant far below expectation (Ethiopian Economic Association-EEA, 2015).

Extensive theoretical and empirical literatures aimed at identifying factors determining the emergence, growth and success of MSEs has been carried out extensively. For instance, Woldehanna et al. (2015) concluded that a newly established firm survival is more likely to depend on initial financial endowment, their human capital, risk aversion, the wish for independence, and the support of their social and family networks. More specifically, Nichter and Goldmark (2009) and Bigsten et al. (2003) found that finance as main constraint to enterprise development. Fafchamps and Pender (1997) and McPherson (1995) found a significant positive relationship between access to credit and firm growth; but others found negative effects (Hardwick and Adams, 2002).

A case study by Alemayehu and Gecho (2016) done in Ethiopia using employment and capital as growth indicators reported that 40 of percent MSEs were growing while the remaining did not experienced growth in terms of employment. In terms of capital 69 percent of MSEs were growing and 31 percent were non-growing. Adem (2014) examined the constraints and growth potentials of MSEs in Mekelle City using cross-sectional data collected from 85 sample MSEs. According to Adam, MSEs' growth in the study area were highly influenced by business constraints. Similarly, with special focus on small scale manufacturing enterprises, Bokoro (2016) conducted survival analysis in Ethiopia; and he found that there was a relationship between firm age and firm survival; older establishments are more likely to survive than new businesses.

Numerous studies can be found in the literature with the focus on MSEs' growth, in urban areas of Ethiopia (Alemu and Dame, 2017; Debelo et al., 2015; Gezahegn et al., 2015; Fufa, 2015; Belay, 2012). Almost all these studies used cross-sectional data, and found factors such as, firms' initial size, firms' year of operation, access to infrastructure, market linkage and information, usage of business plan and involvement in social networking, sources of finance/ access to capital, managerial skill and location of the business to be statistically significant proxy factors that influence MSEs' growth. However, those previous studies do not labeled growth as firm's transit from one stage to the next stage. Thus, those firms with a growth rate of ≥ 0 are classified as a growing and below as non-growing.

Moreover, despite the extensive treatment of MSEs' contribution to employment generation, innovation and poverty reduction (Davidsson and Wiklund, 2000; Wiklund et al., 2007), there are no studies and findings which try to address the average time

micro and small enterprises need to graduate (from micro to small and from small to medium) except for the work of Mashimba and Kühl (2014) on Tanzania, and Woldehanna et al. (2015) on Ethiopia who estimated enterprise duration model. Likewise, the works of Bokoro (2016) and Shiferaw (2006) focuses on proportion of failed firms by sector and duration of operation, and once they survived, growth rates factors but not the time to graduate from one stage into the next stage. The literature in this regard, to the best of our knowledge, is very scant. Hence, this study attempts to fill the gap by providing an empirical evidence of MSEs' hazard rate and its determinants in Ethiopia using duration model analysis. In this paper, we examined factors affecting the MSEs' hazard rate and tried to estimate the average time required to graduate from one stage into the next stage (from micro into small and small to medium level).

The noble contribution of this paper is twofold: First, governments spend large amounts of money to support and promote the development of MSEs. This is becoming a universal phenomenon. However, countries do not have a clear information on how much of the enterprises are growing quickly or gradually, the average time it takes them to graduate from one stage to the next, main factors affecting the graduation of MSEs, how many of them are financially included/excluded. Getting an answer to these questions will greatly help policy makers to design evidence based new intervention. Second, if all enterprises do not experience identical growth pace, and do not contribute to an economy, they should not deserve equal public attention and budget allocation. Limited available public resources should be efficiently targeted to those efficient enterprises with high growth rate. Hence, these targeting needs to be done based on empirical evidence and this is the second reason for this paper.

2. LITERATURE REVIEW

Related theories and previous empirical works were reviewed from theoretical and empirical perspectives, thereby the conceptual framework of the study was designed. Although there is no clear definition of MSEs; indeed, different countries define it differently, the number of employees engaged by the enterprises is the more commonly used unit of measurement of the size of business than the other measurements (such as capital and sales volume) due to non-sensitivity to inflation and other measurement problems (Ghebreyesus, 2007).

In the literature, there is no single pattern but rather a multitude of factors which determines MSEs' lifecycle. However, the importance of the different determinants might differ between firms in developed countries and those in developing countries. Broadly, we categorized these factors into firm-specific characteristics and regulatory/ business environment variables. World Bank (2011a) reported that regulatory policies in most developing countries described as burdensome, complex and, in some cases, opens opportunities to exact bribes, especially to access credit. Finance is necessary to their growth but MSEs in many developing countries face greater financial constraints than

do larger firms (Garavito and Bermudez, 2016; Nichter and Goldmark, 2009; World Bank, 2011).

Specifically, lack of access to credit, insufficient loan size, delay in credit release and collateral are the main challenges of MSEs in Ethiopia (Ageba and Amha, 2006). For this reason, MSEs forced to resort to alternative credit sources, such as iqub/idir[1], family, friends/relatives and personal savings (Selamawit et al., 2014). Another important factor affecting MSEs' growth is access to basic infrastructure (see Tarfasa et al., 2016; EEA, 2015; Belay, 2012; Gebreeyesus, 2011). Nkurunziza (2005), Astebro and Bernhardt (2003), and Mayer and Goldstein (1961) also argued that credit is helpful when it is accessible and reasonably priced, otherwise may have a negative impact.

Few studies assessed the association between education/level of human capital embodied in the entrepreneur and firm growth and it was found that proper and relevant education level positively affects firm growth (Shibia and Barako, 2017; Alemu and Dame (2017). Accordingly, the above-mentioned studies found that a firm owner/ manager with a relatively higher level of education have a greater ability to efficiently allocate resources to more productive lines of business and to select profit maximizing inputs/combinations. However, as noted by Ghebreyesus (2011), technical skill is more important than general (academic) education in promoting entrepreneurship and innovation. The literature on gender and MSEs growth indicated, MSEs headed by women tend to be concentrated in a relatively narrow range of activities, devote their profit to minimize risk and increase security of the welfare of the household (Liedholm and Mead, 1998; Alemu and Dame, 2017). With regard to previous experience, MSE owner/managers with more managerial, sector experience or prior experience as owner/manager tend to correlate with greater growth (Woldie et al., 2008). Mashimba and Kühl (2014) found a negative association between manager-owner's experiences and MSEs' hazard duration in Tanzania.

Under the enterprise characteristics category, Woldehanna et al. (2015) mentioned that locating business in an area where there is high sectoral linkage might increase the chance of survival in Ethiopia. However, Acs and Armington (2004) argued that very little is known about the impact of location on micro firm's growth. Garavito and Bermudez (2016) stating the role of new machinery introduction and/or organizational changes (process innovation) on enterprises performance found that these two inputs tend to decrease the hazard rate of large firms but does not alter the risk of small firms' failure. Gebreeyesus (2011) found that innovators are more likely to grow than non-innovators, and innovation activity found to be strongly associated with firm size, thus the larger the firm size, the more likely to involve in an innovative activity. Furthermore, scholars' debate on the effect of competition on firms' growth. Hansen et al. (2009)

[1] Iqub-an informal financial saving system where members receive in rotation what members pay regularly (e.g., an Iqup with 12 members and monthly US$100 payment will get US$ 1200 in rotation where the turn determined by draw). Idir is an association in which people are united through living in the same neighborhood and membership is voluntarily.

found a negative relationship between competition intensity and firm growth or increase in employment level. However, Capellers and Rabetino (2008) argued competition to be crucial to firms' growth.

3. DESCRIPTION OF STUDY AREA AND DATA

3.1. Description of the Data and the Study Area

The data source for this study was the World Bank Enterprise pool cross-section data for Ethiopia collected during 2011 and 2015 through reliable questionnaire. The data was collected as part of the African survey, firm-level survey data organized on a yearly basis for 785 firms out of which 499 micro, 167 small and 119 medium firms in Ethiopia. For this study, only the data from micro (499) and small enterprises (167) is used mainly due to minimum missing data nature. The full data comes from an independent cross section dataset conducted in 2011 or 2015 but pooled to yield the total sample size of 785 firms. The firms in these two years do not necessary mean they are same. The classification enterprises are based on number of employee or capital. According to the Federal Micro and Small Enterprise Development Agency (FMSEDA) (2011), the MSEs definition in Ethiopia is summarized below. A firm with five or less than is considered to be micro enterprise and a firm with 6 and above number of employees is classified as small enterprises.

Table 1. Definition of MSEs in Ethiopia

Enterprise category	Sector	No. of Employees	Capital in Birr
Micro	Industry	≤5	< ETB 100,000
	Service	≤5	< ETB 50,000
Small	Industry	6-30	< ETB 1,500,000
	Service	6-30	< ETB 500,000

Source: FMSEDA, 2011.

3.2. Sample Size and Sampling Procedure

The total sample units were 666 enterprises out of which: 499 are micro and 167 are small enterprises. Three levels of stratification were used to generate the sample units. Industry stratification was used to divide the universe into manufacturing industry and service. The second stage stratification was again applied to regroup the sample frame by size. The final was regional stratification; which includes five major regions: Addis Ababa, Oromiya, Southern Nations and Nationalities and Peoples (SNNP), Tigray and Amhara (Table 2). These regions are the home of more than 90 percent of the total

number of enterprises in the country and hence, the sample units are representative of the total MSEs in the country.

Although the delineation of enterprise's size in Ethiopia is measured by number of employees and amount of capital, for the purpose of analysis in this study the number of employees is used to define enterprise size/category and hazard /failure rate. Accordingly, micro enterprises are those firms with number of employees less than or equal 5 persons, whereas small enterprises are those firms with number of employees 6-30 persons. Hence, when a micro firm crosses employment level of greater than 5 employees, it graduates to small and when small firm crosses 30 employees, it graduates to medium level.

Table 2. Sample Size Distribution by Year and Size

Year	Enterprise size		
	Micro	Small	Total
2011	129	69	198
2015	370	98	468
Total	499	167	666

Source: World Bank, Enterprise Survey (2011 and 2015)

4. EMPIRICAL MODEL SPECIFICATION

To estimate the hazard rate, the time required to graduate, duration model was applied. Duration model has its origin in survival analysis, where the duration of interest is the survival of a given subject. While in economics this model is used in labor market studies, where unemployment spells were analyzed (Verbeek, 2008). More recently, Hannan and McDowell (1984, 1987); Karshenas and Stoneman (1993); Burton et al. (2003) have used it to capture dynamic aspects of adoption processes of agricultural technologies. Since this study intends to estimate the survival, hazard rate and the factors affecting the probability that the state occupied by the enterprise will end; graduate into the next level: micro to small and small to medium level, in the next short time interval given that it has lasted to that period. Graduation of enterprises from one stage into the next stage is measured by the number of employees.

4.1. Survival Function

Coming to the model specification, T is a non-negative continuous variable representing the duration of stay in a given state measured in years and the probability of an enterprise stays in the same state until or beyond time (t) is given by the survival function.

$$S(t) = \Pr(T \geq t) = 1 - F(t), \quad (1)$$

where t is the age of an enterprise, the survivor function reports the probability of surviving beyond time t.

4.2. Hazard Function

The hazard function is defined as the limiting value of the probability that T lies between t and $t + \Delta t$, conditional on T being greater or equal to t, divided by the interval Δt, as Δt tends to zero.

$$h(t) = \frac{f(t)}{S(t)} = \lim_{dt \to 0} \frac{\Pr(t \leq T < t + dt | T \geq t)}{dt}, \quad (2)$$

where $F(t)$ and $f(t) = dF(t)/dt$ are the corresponding cumulative distribution and probability density function, respectively. In enterprises graduation study, the hazard function, therefore, represents the probability that an enterprise will move into the next stage (micro into small and small into medium) at time t, given that the enterprise has not graduated or dropped before t.

Given a vector of explanatory variables x_i, the hazard function may be redefined as (Lancaster, 1990),

$$h(t, X_i) = h_0(t) e^{\sum_{i=1}^{N} \beta_i X_i}. \quad (3)$$

The hazard function $h(t, X_i)$, $h(t)$ gives the instantaneous potential per unit time for the event to occur, given that the firm has survived up to time t given the set of explanatory variables denoted by X_i. Equation (3) the $h(t, X_i)$ represents Cox model at time t - is the product of $h_0(t)$ which is the baseline hazard and the exponential expression e to the linear sum of $\beta_i X_i$.

The two most popular ways of specifying hazard function are the proportional hazard (PH) and the accelerated failure time models (AFT).

4.3. The PH Specification

The hazard rate in all proportional hazard models can be written as follows:

$$h(t, X_i) = h_0(t) e^{\sum_{i=1}^{N} \beta_i X_i} = h_0(t) \lambda, \quad (4)$$

where $h_0(t)$ is the baseline hazard and depends on t but not X_i; indicating the pattern of time dependence that is assumed to be common to all units; $\lambda = e^{\sum_{i=1}^{N} \beta_i X_i}$ on the other hand is a unit-specific (non-negative) function of covariates (which does not depend on t) which scales the baseline hazard function common to all units up or down. Once we

recognize the time dependency, the three hazard parameterization models which specify a particular shape for the hazard rate can be specified as follows (Cleves et al., 2010; Jenkins, 2004).

i) Exponential Model: assumes a flat hazard which implies the risk of an event occurring is flat with respect to time.

$$h(t, X_i) = \lambda_i = e^{\sum_{i=1}^{N} X_i \beta_i}. \quad (5)$$

ii) Weibull Model: assumes a monotonic hazard.

$$h(t, X) = \lambda p(\lambda t)^{p-1} = \exp(\beta_0 + X_i \beta_i)\, p t_i^{p-1}, \quad (6)$$

where $\lambda = e^{Xi\beta i}$ and p is a shape parameter.

iii) Gompertz Model: follows monotone hazard rates that either increase or decrease exponentially with time.

$$h(t) = \lambda e^{\gamma t} = \exp(\gamma t) \exp(\beta_0 + X_i \beta_i), \quad (7)$$

where $\lambda = e^{Xi\beta i}$ and p is a shape parameter.

4.4. The AFT Specification

The word "accelerated" is used in describing AFT models, assumed for $T_i = \exp(-X_i \beta_i) t_i$ and $\exp(-X_i \beta_i)$ is called the acceleration parameter (Cleves et al., 2010). Moreover, the AFT model assumes a linear relationship between the log of (latent) survival time T and characteristics of the units X.

$\ln(T) = X\beta + z$, where β is a vector of parameters and z is an error term. This may be rewrite as:

$$Y = \mu + \sigma u = Y - \mu/\sigma = u, \quad (8)$$

where $Y = ln(T)$, $\mu \equiv X\beta$, and $u = \mathrm{z}/\sigma$ is an error term with density $f(u)$ and σ is a scale factor which is related to the shape parameter of the hazard function.

Having the above AFT model specification, the distributional assumptions about u determine which sort of AFT model describes the distribution of the random variable T. With this regard, five parametric AFT models (time parameterization models) have been specified; to analyze the risk of an event occurring (firm's graduation) over time T and the set of covariates, and thereby the best model was selected using appropriate model selection criteria. The models include Weibull distribution, Exponential distribution,

Log-logistic distribution, Lognormal distribution and Gamma distribution. Accordingly, the AFT models functional form is presented below (see Cleves et al., 2010).

i) Exponential Model:

$$h(t, X_i) = \lambda_i = e^{\sum_{i=1}^{N} -X_i\beta_i}. \tag{9}$$

Thus, the key note is that $\lambda_i = e^{X_i\beta_i}$ in the PH format and $\lambda_i = e^{-X_i\beta_i}$ in the AFT format (the change in signs).[2]

ii) Weibull Model:

From the AFT specification such that:

$$\ln(T) = X\beta + \sigma u. \tag{10}$$

The relationship between PH and AFT Weibull metric given as:

$$\beta_{AFT} = \frac{-\beta_{PH}}{p} \text{ or } \beta_{PH} = \frac{-\beta_{AFT}}{\sigma}. \tag{11}$$

Hence, the AFT Weibull metric is written as:

$$h(t, \lambda_i, \gamma) = \gamma\lambda_{it}^{\gamma-1}, \tag{12}$$

where $\lambda_i = e^{Xi\beta i}$ and the effect of the covariates is to accelerate time by a factor of $\exp(-X_i\beta_i)$.

iii) Lognormal Regression Model:

It assumes a non-monotonic hazard with an inverted U-shaped hazard function. Its hazard function is given as:

$$h(t) = \frac{\frac{1}{t\sigma\sqrt{2\pi}} exp\left[\frac{-1}{2\sigma^2}\{Ln(t) - \mu\}2\right]}{1 - \Phi\left\{\frac{Ln(t)-\mu}{\sigma}\right\}}, \tag{13}$$

where Φ is the standard Normal cdf; $u = X\beta$ and σ is a shape parameter.

[2] The change in sign makes sense because the PH format uses covariates to model the hazard rate whereas the AFT format uses covariates to model the survival times. The AFT metric gives a more prominent role to analysis time.

iv) Log Logistic Regression Model:

This model is appropriate for data with non-monotonic hazard rates and where the error term follows the Log-Logistic Distribution. It has an inverted U-shaped with the following hazard function:

$$h(t,X) = \frac{\lambda^{\frac{1}{\gamma}} t\left[\left(\frac{1}{\gamma}\right)-1\right]}{\gamma\left[1+(\lambda t)^{\left(\frac{1}{\gamma}\right)}\right]}, \tag{14}$$

where $\lambda_i = e^{-X_i\beta_i}$; λ is the location parameter and γ is the shape parameter.

v) Generalized Gamma Regression Model:

It has two shape parameters (ρ and κ) and possessing a highly flexible hazard function that allows for many possible shapes. The density of the generalized gamma distribution is:

$$f(t) = \frac{\lambda p(\lambda t)^{pk-1} e^{-(\lambda t)^{pk}}}{\Gamma(\kappa)}, \tag{15}$$

where $\lambda_i = e^{-X_i\beta_i}$ and includes special cases/ shape parameters: if $\kappa = 1$, then the Weibull distribution is implied; if $\kappa = p = 1$, the exponential is implied; if $\kappa = 0$, the log-normal is implied; if $p = 1$, the gamma distribution is implied.

An important issue in the duration analysis is the issue of duration dependence, thus "true" duration dependence or "state dependence" versus spurious" duration dependence. Following Lancaster (1979), the problem is addressed by introducing a multiplicative random effect in the PH specification shown in Equation 3 above.

$$h(t,x_i,v) = h_0(t)e^{\sum_{i=1}^{N}\beta_i X_i} v, \tag{16}$$

where v is a real positive random variable with mean one and variance θ, and θ is estimated from the data (Cleves et al., 2010; Lancaster, 1979).

On top of that, since sample units of the study are heterogeneous, some started with micro and others began with small status, separate models were run for each one of the transitions, i.e., one for a transition from micro to small and another for a transition from small to medium. Therefore, given the different parametric model specification the Akaike's Information Criterion (AIC) was conducted to pick the right distributional function ('right' shape for the time dependency).

5. RESULTS AND DISCUSSIONS

5.1. Descriptive Results

In this study, a hazard rate is estimated, covering both the occurrence of an event and time elapsed before the occurrence of an event. Therefore, the outcome variable represents firm's graduation/ failure events', and the average time span until firm graduate. This implies that a firm is said to be in a failure (failure=1) if the firm graduate from micro to small or small to medium and non-graduate if it increases employment which enable to enter into the next level or stays in the same firm's class level respectively. The time is also measured as the age of an enterprise in years and finally, survival is to mean the no-graduation state of the firm.

Table 3. Size Description of Variables

Variable	Description	Nature of the Variable	Expected Sign
life_year (t)	Age of enterprise in years	Continuous	-
Percent_managtime	% of management time spent in dealing with government regulations	Continuous	Negative
compet_informal	Establishment competition against unregistered or informal firms	Dummy	Positive/ Negative
obstacle_electricity	Electricity obstacle to the operations of the establishment (Yes=1)	Ordinal	Negative
manager_exper	Manager's experience in years	Continuous	Positive
employee_highschool	% of full time workers completed high school	Continuous	Positive
obstacle_transport	transport obstacle to the operations of the establishment (Yes=1)	Dummy	Negative
obstacle_customs	Customs and trade regulation obstacle to the operations of the establishment (Yes=1)	Dummy	Negative
business_improvement	Logistical or business improvement	Dummy	positive
obstacle_accessland	Access to land obstacle to the operations of the establishment (Yes=1)	Dummy	Negative
firm_location	Firm location (1= if the city is the main business city, 0 otherwise)	Dummy	Positive
Power_outages	Average duration of power outages in hours and minutes	Continuous	Negative
private	Credit access from private financial institution (Private=1, 0 otherwise)	Dummy	Positive
gov	Credit access from public financial institution (gov=1, 0 otherwise)	Dummy	Positive
inter_fund	% of working capital financed from internal funds/retained earnings	Continuous	positive
event	Event=1 if the firm graduate, 0 otherwise	Dummy	-

Source: World Bank, Enterprise Survey (2011 and 2015)

Table 4. Descriptive Statistics for the Hypothesized Explanatory Variable

Variable						
	Obs		**Mean**		**Std. dev.**	
	Micro	**Small**	**Micro**	**Small**	**Micro**	**Small**
Dependent variable						
t	406	167	19.258	10.449	11.350	5.916
event	499	167	0.300	0.144	0.458	0.352
Average time to graduate	130	24	14.735	6.917	8.3229	5.1492
Explanatory variables						
Access to finance						
Private/credit	499	167	0.38	0.24	0.486	3.095
government/credit	499	167	0.30	0.18	0.460	29.355
inter_fund	499	167	0.85	0.79	26.53	29.75
Firm specific variables						
Percent_managtime	499	167	7.567	6.383	14.312	13.05
compet_informal	499	167	0.405	0.772	0.491	0.42
employee_highschool	499	167	66.671	14.772	32.802	10.43
manger_exper	499	167	13.182	65.659	8.705	27.67
firm_location	499	167	0.725	0.216	0.446	0.41
business_improvement	499	167	0.317	0.485	0.465	0.50
Business environment/ regulatory system						
Power_outages	499	148	5.184	9.236	21.866	35.567
Degree of the problem response in percent						
	No obstacle		**Minor Obstacle**		**Moderate Obstacle**	
Microenterprises						
obstcle_electricity	15		25		26	
obstacle_transport	49		27		13	
obstacle_custom	59		16		11	
obstacle_accessland	45		14		10	
Small enterprises						
obstcle_electricity	5		20		28	
obstacle_transport	37		32		19	
obstacle_custom	32		26		16	
obstacle_accessland	40		14		10	

Source: World Bank, Enterprise Survey (2011 and 2015) and own estimation.

In general, the variables used in our analysis, hypothesized direction of influence and their operationalization are depicted in Table 3. The variables included are firm specific

variables, infrastructure related variables, and policy and regulatory variables. To capture MSEs' specific variables; business environment and access to infrastructure and services variables such that transport, customs and trade regulations, access to land, electricity supply and power outages are included in our model specifications. Despite these variables were measured as ordinal with natural order, the particular numbers assigned to the ordering are in their relative magnitude, not in their cordiality. Hence, they cannot be directly included in our model. For this reason, the variables have used as indicator variables in the model estimation results (see Cleves et al., 2010).

The descriptive analyses for the hypothesized explanatory variables of the sampled MSEs are depicted in Table 4 below. Based on the descriptive analysis the average age of firm's (micro enterprises) was found to be 19 years and average time to graduate was found to be 15 years, with an average probability of 30 percent that an event to occur. Similarly, the average age of small firms in the sample was 10 years and average time to graduate was found to be 7 years, with an average probability of 14 percent an event to occur. Moreover, out of the total sample, 130 and 24 enterprises were found to graduate from micro to small and from small to medium levels, respectively.

With regard to access to credit, on average, 38 percent of micro enterprises reported to have access from private and 30 percent from government financial institutions. Whereas 24 percent and 18 percent of credit sources for small firms was private and government institutions respectively. Accordingly, samples of MSEs' with access to credit (both private and public credit sources) was found to be above the Sub-Saharan African average which is 16.2 percent (World Bank, 2011), and even slightly better than the national average of 19 percent. Based on the descriptive statistics 85 percent of the micro and 79 percent of the sampled small enterprises reported their working capital was financed from internal funds/retained earnings. This concurs the findings of Beck et al. (2006) who indicated that small firms rely more on internal and informal finance but less dependent on formal financial institutions compared with large firms. Similarly, in a study of credit constraints in four African countries, Bigsten et al. (2003) suggested that firm size is a strong determinant in obtaining credit.

Concerning the business environment, except electricity supply MSEs reported that they did not experience serious infrastructure and government regulatory problems, which is against our expectations. This may imply the high attention given by the government to development and proper function of MSEs. On the other hand, more than 40 percent of the micro firms and 77 percent of the small enterprises reported the serious competition they experience from the unregistered firms and thereby undermining their survival and growth.

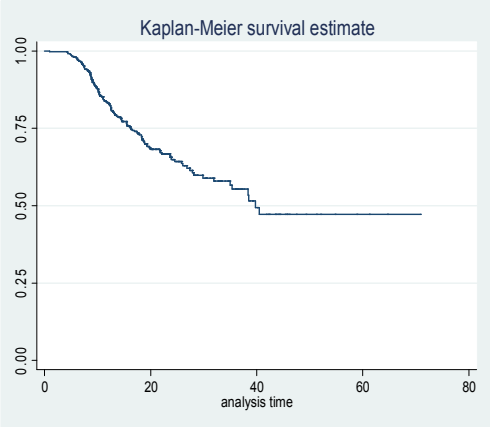
To understand why MSEs' growth matters, we have also estimated their contribution in terms job creation; accordingly, our sampled micro enterprises with an average of 3.16 employments per firm they have created a total employment of 1,577 during their establishment and the number increased to 3,203 jobs in 2010. Similarly, the sampled small enterprises created 21,426 job opportunities during their establishment and jumped into 40,164 jobs in the 2010 survey year. Thus, the data supports the World

Development, 2013 report on 'Jobs'; which indicated MSEs account for more than half of all jobs worldwide (Grimm and Paffhausen, 2014).

5.2. Non-Parametric Analysis

Nonparametric methods do not make assumptions neither about the distribution of the failure times nor how covariates change the survival experience. Kaplan-Meier most important and most frequently used function form among the class of non-parametric methods. The Kaplan-Meier procedure (as illustrated in Figures 1(a) and 1(b) below) generates a step function estimate of survival over listing age of the firm. Thus, Kaplan-Meier curve is where the survival rate is plotted against the age of the firms.

a) Micro Enterprises



b) Small Enterprises

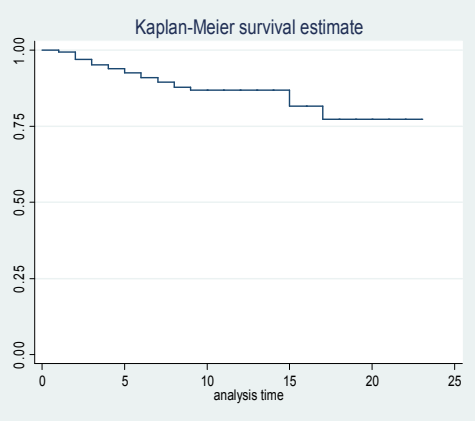


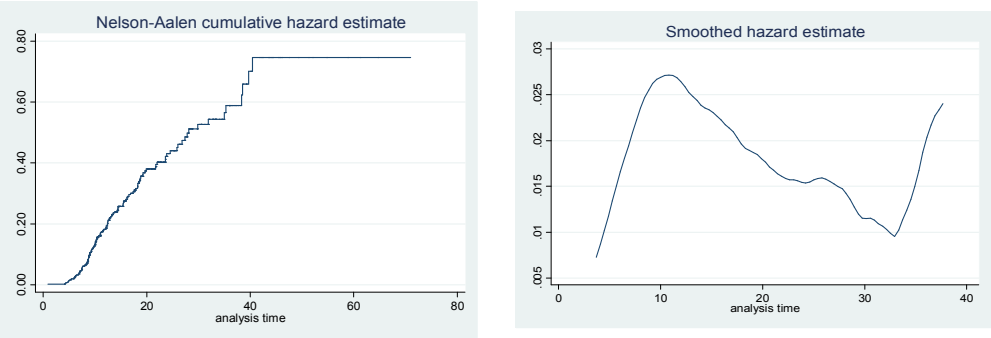
Figure 1. Kaplan-Meier Survival Functions

The curves start with 100 percent of the firms (at analysis time zero) and drops towards zero as time passes; which shows firms exit from the micro level to small and from small to medium level.

From Figures 2(a) and 2(c), cumulative hazard curves, we observe that there is a sharp rise in the cumulative hazard at the beginning of the analysis time and then decelerates, reflecting higher hazard rate during the startup period. On the other hand, the smoothed hazard curves for sampled MSEs are increasing from 0 towards 1 and reach to some point and then starts declining downwards. Accordingly, the smoothed hazard curves/2(b) and 2(d), demonstrate the risk of firm's exit state (firm's graduation) which increases during the startup phase of the enterprise until it reaches its peak at 10 years for micro enterprises and 5 years for small enterprises.

a) Cumulative hazard function estimate (Micro Enterprises)

b) Smoothed hazard estimate (Micro Enterprises)



c) Cumulative hazard function estimate (Small Enterprises)

d) Smoothed hazard estimate (Small Enterprises)

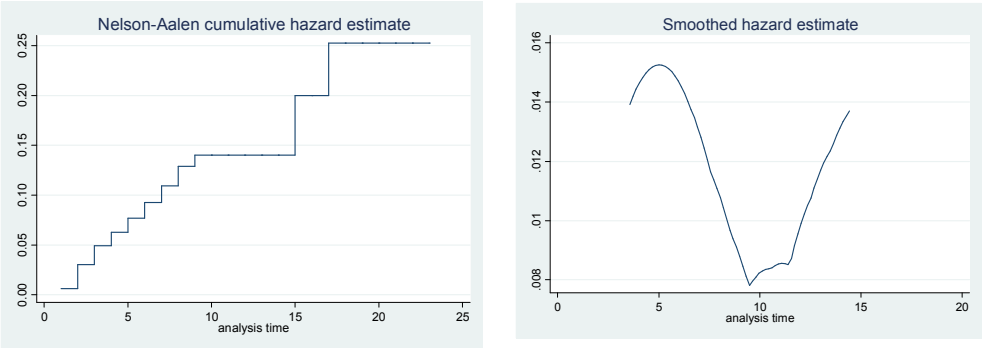


Figure 2. Hazard Functions

Based our brief non-parametric survival analysis /hazard function, it can be suggested that there is survival differential among micro and small enterprises in Ethiopia. The non-parametric survival differential among micro and small enterprises was also supported by the log rank test, the null hypothesis of no survival difference between the groups was rejected at 1 percent level of significance (Chi^2, $p = 0.000$).

5.3. Semi-Parametric and Parametric Estimation Results

As a starting point of the analysis, semi parametric proportional hazard regression, Cox- proportional model is estimated for the sampled enterprises. Using the proportional hazard Cox model, the relationship between the probability of an event/failure occurrence and various covariates has been analyzed. In the semi parametric proportional hazard regressions, no assumptions have to be made about the shape of the

baseline hazard rate but firms assumed to have different values on covariates (Cleves et al., 2010).

As robustness check and compare results across alternative, three hazard parameterization models have been estimated. Accordingly, exponential, Weibull and Gompertz were estimated but based on the Log likelihood-ratio, and AIC and BIC test statistics, Weibull proportional hazard was favored. Hence, the discussion and analysis is based on mainly the Weibull metric estimated results, which assumes a proportional relationship between the baseline hazard and the influence of respected covariates. Hazard ratios are reported for the CoxPH and PH models.

A hazard ratio greater (less) than one denotes that the variable has a positive (negative) impact on the likelihood of the spell ending, that is on graduation. A unity hazard ratio implies no impact of the variable on graduation. The shape parameter, ρ is 3.29 for micro and 1.49 for small indicate positive duration dependence. That is, the probability of firms' graduation increases with time.

Accelerated Failure-Time (AFT) models are also alternatively estimated and presented in Table 6 so as to check the robustness of the effect of the specified covariates on MSEs' waiting time. Thus, the effect of the covariates is to accelerate time by a factor of exp $(-X_i\beta_i)$. Standard coefficients are reported for the AFT model. The parameter estimates for this model is reported in accelerated failure-time metric and represent the effect of an explanatory variable on the conditional probability of graduation at time period *t*.

A negative coefficient indicates a shorter pre-graduation spell (that is the relevant variable speeds up the graduation process) and increases the probability of graduation, while a positive coefficient reflects longer pre-graduation spell and lower probability of graduation. A positive (negative) coefficient would indicate a factor that would delay (accelerate) graduation; and vice versa. Table 6 presents estimated results of lognormal selected from the five AFT models. That is, based on robustness check of AIC, BIC and the Log likelihood statistics show that the lognormal model fits best to describe our data since it had the least AIC and BIC values with the maximum Log likelihood values.

Table 5-6 exhibits consistent results from both estimates. especially, the hypothesized explanatory variables such as managerial time share, competition from unregistered informal sector, electricity problem, managerial experience, business improvement, power outage, firm location, access to credit and retained internal fund, showed a significant association to the hazard ratio that range from 1%, to 10% (see the detail in Table 5). Against our expectation, transport problem appears to have no influence on the graduation on both sectors and in both models.

Interestingly, the finding of this study showed a positive association between percent of management time spent in dealing with government regulations and MSEs' hazard rate. A manager's time share appears to influence graduation and has positive effect; suggesting that the higher the manager's time share, the higher the likelihood of graduation at any time. A one unit increase in manager's time share, holding other variables constant, more likely to reduce the estimated hazard of micro or small SME

graduation by 3.6% (Table 5). From the AFT model (Table 6), higher manager's time share, on average decreases micro and small time to graduate, other variables held constant, by 1% and 2.4% respectively.

Table 5. Estimates of Proportional Hazard Model for Micro and Small Enterprises

	Mirco		Small	
Variales (small)	Weibull PH-HR	Cox PH-HR	Weibull PH-HR	Cox PH-HR
Percent_managtime	1.036***	1.035***	1.040**	1.036***
	(0.009)	(0.009)	(0.018)	(0.012)
Compet_informal	0.257***	0.276***	0.514	0.560
	(0.062)	(0.072)	(0.317)	(0.343)
Obstacle_electricity	0.345**	0.328***	0.231*	0.265*
	(0.151)	(0.135)	(0.190)	(0.198)
Manager_exper	1.014	1.012	1.057*	1.059*
	(0.012)	(0.013)	(0.030)	(0.032)
Employee_Highschol	0.989***	0.989***	1.006	1.006
	(0.003)	(0.004)	(0.011)	(0.009)
Obstacle_transport	0.902	0.823	0.924	0.992
	(0.208)	(0.228)	(0.696)	(0.887)
Obstacle_customs	1.109	1.081	1.093	1.090
	(0.103)	(0.099)	(0.665)	(0.700)
business_improvement	3.398***	3.368***	2.171	2.148*
	(0.769)	(0.948)	(1.043)	(0.919)
Obstacle_accessland	0.658*	0.691	0.266**	0.274**
	(0.144)	(0.160)	(0.161)	(0.160)
Firm_location	4.471***	4.309***	3.415**	3.171**
	(1.370)	(1.291)	(1.796)	(1.441)
Power_outages	0.989	0.990	0.934	0.943*
	(0.024)	(0.021)	(0.047)	(0.029)
Gov	0.065***	0.074***	1.268	1.143
	(0.018)	(0.022)	(0.846)	(0.780)
inter_fund	1.011**	1.010*	1.063**	1.063*
	(0.005)	(0.005)	(0.027)	(0.038)
constant	1.521***		6.301***	
	(1.610)		(1.791)	
Ancillary	$\rho = 3.29$		ρ =1.49	
Model diagnostics:				
N (number of observations)	406	406	167	167
Log likelihood	-99.58	-527.99	-61.63	-83.13
AIC	253.16	874.38	183.30	874.38
BIC	354.48	923.16	223.83	923.16

Source: World Bank, Enterprise Survey (2011 and 2015) and own estimation: Note: Figures in parenthesis are Robust Std. Err. Values and *, ** and *** indicate statistically significant at the 10%, 5%, and 1% level, respectively.

Table 6. AFT Models' Estimation for Micro and Small Enterprises

Variables (small)	(Micro) Lognormal	(Small) Lognormal
Percent_managtime	-0.010***	-0.024*
	(0.002)	(0.015)
Compet_informal	0.444***	0.388
	(0.058)	(0.410)
Obstacle_electricity	0.398***	1.102**
	(0.111)	(0.525)
Manager_exper	-0.005	-0.041**
	(0.003)	(0.017)
Employee_Highschol_comp	0.004***	-0.005
	(0.001)	(0.007)
Obstacle_transport	0.036	0.363
	(0.059)	(0.396)
Obstacle_customs	-0.008	-0.236
	(0.022)	(0.362)
business_improvement	-0.390***	-0.688**
	(0.058)	(0.345)
Obstacle_accessland	0.156***	0.963**
	(0.056)	(0.386)
Firm_location	-0.505***	-0.969**
	(0.077)	(0.472)
Power_outages	0.006	0.059
	(0.007)	(0.036)
Gov	0.878***	-0.131
	(0.068)	(0.423)
inter_fund	-0.001	-0.028***
	(0.001)	(0.009)
Constant	2.948***	6.788***
	(0.156)	(1.502)
/ln_sig	-1.269***	0.156
	(0.071)	(0.171))
Sigma	0. 280	1.168
	(0.020)	(0.200)

Note: Figures in parenthesis are Std. Err. Values and *, ** and *** indicate statistically significant at the 10%, 5%, and 1% level, respectively.

This is in line to the empirical literature by World Bank (2011) which revealed regulatory policies in most developing countries reported to be burdensome, complex and costly and deterrent for firms to scale up productive activities. Hence, it requires more time spending in order to internalize and comply with the routine government formalities. As noted in the Schmidt's model (Motta, 2002) more managerial effort/time

put in, enhances efficiency of the firm, and reduces the probability to close down the firm. Micro or small SMEs, which are led by more experienced manager, compared with enterprise those managed by less experienced managers were found to be, more likely to graduate quickly. Accordingly, one year of manager's experience increases small enterprise' hazard rate by 5.7%. Hence, the more and the better managers 'experience is, the shorter time it takes for the firm to grow. Our result concurred the findings of (Woldie et al., 2008) who report a positive relationship between MSE owner/managers experience with greater growth.

Our estimated result signifies a positive association between MSEs' hazard rate and manager's experience in Ethiopia; similar result was also echoed by AFT model, where micro/small enterprise with more manager's experience graduate faster (4.1%) than micro/small enterprise with less manager's experience. The result supports the finding by Milagrosa (2014), owner/managers with more managerial, sector experience or prior experience as owner/manager tend to be correlated with greater growth. However, the result contradicts Mashimba and Kühl (2014) who found a negative association between manager-owner's experiences and MSEs' hazard duration in Tanzania.

Our result revealed a negative association between MSEs' hazard rate and degree of competition from unregistered firms; implying a micro or small firm with a strong competition from the unregistered firms, found to have a lower probability of graduation or growth than those without competition. The AFT model has also gave similar results, a firm with a strong competition from the unregistered firm (both micro or small firm) increase time to graduate, other variables being held constant, by 44.4% on average. This is also consistent with Hansen et al. (2009), who reported a negative relationship between competition intensity and firm growth or increase in employment level. Yet, there are some authors who argue that a high intensity of competition has a marginal positive effect on employment growth (see Capellers and Rabetino, 2008).

Another variable which was considered to affect MSEs' growth is access to basic infrastructure, such as access to power and land (see Tarfasa et al., 2016; EEA, 2015; Belay, 2012; Gebreeyesus, 2011). The evidence regarding the importance of access to electricity and land variables in terms of firms' graduation/growth process is reasonably strong, with the relevant coefficients being negative (hazard < 1) and statistically significant in both micro and small enterprise.

An obstacle to electricity access, holding other variables constant, reduces the estimated hazard of micro enterprises' graduation to 34.5% of its starting value, and hazard of small enterprises' graduation to 23%. Likewise, the estimated hazard of micro and small graduation is dropped to 65.8% and 26.6% of their starting values respectively due to the problem of access to land. The results from the AFT model, revealed that, other variables held constant, an electricity and access to land problems, on average, decreased the time to graduate for a micro enterprise, by 39.8% and 15.6% respectively. Likewise, the time to graduate for a small enterprise decreases by10.2% and 96.3% respectively due to electricity and access to land problems. This is consistent with our prior expectations and findings in the literature (Adam, 2014).

A negative and significant impact of employee's level of schooling on the micro-enterprises hazard was found, which is against our expectation, while the impact on small enterprises hazard is found to be positive and insignificant. Signs of employee's level of schooling in the AFT model appear to be positive, which indicates the higher the employees' level of schooling, the more time it takes to graduate. In this regard, Gebreeyesus (2011) argued that technical skill is more important than general education in promoting entrepreneurship and innovation. Besides, Belay (2012) reported schooling as less plausible determinant of firms' success in Ethiopia. However, contrary to our results, Nichter and Goldmark (2009); Capelleras and Rabetino (2008); Heshmati (2001) reported a positive effect of the variable on the micro-enterprises hazard.

Our finding also indicated a strong positive significant effect whether or not the enterprise had introduced any system/business improvement on micro-enterprises' hazard rate. Considering the magnitude and significance of the coefficients in both models, business improvement had more influence on graduation of micro firms than small firms. If the micro firm had any business improvement effort, its probability of graduation increased its hazard rate by 3.4 times higher while small firms were by 2.2 times. Consistent with this result, the AFT model revealed that a micro enterprise with an improved business system tend to graduate by 39% earlier than a business without business improvement and a small enterprise by 68.8% faster than their counterparts.

Our results are consistent with, Banbury and Mitchell (1995) who argued that firm introducing continuously product innovations strongly influences its market share and thereby its survival. However, other authors argued that the relationship between micro-enterprises' hazard rate and business improvement can be negative due to environmental uncertainty (Freel, 2005; Garavito and Bermudez, 2016; Gebreeyesus, 2011).

Consistent with our expectation, the enterprise's location was found to be positive and highly significant. In line with this, Woldehanna et al. (2015) mentioned that firm's location in an area where there is high sectoral linkage tend to increase the chance of survival in Ethiopia. The coefficient of a dummy variable indicating whether the firm is located in business city was found to be significant at the 5% level. If a firm is located in a business city, the micro firm showed a 4.471 times higher hazard rate than a micro firm located outside of a business city. Likewise, the reported hazard ratio for the variable denoting location for small firm (3.4) indicates that small firms located nearby to business city have a conditional probability of graduation which is almost three and half times than of their small firm counterparts. Comparing the result of PH and the AFT models indicated that location in a business city decreases the log of time to failure (time to graduate) by 0.505 for micro and 0.969 for small. That is, location in a business city decreases the waiting time to micro and small graduation by 50.5% and 96.9% respectively.

This coincides with Hansen et al. (2009) findings in Vietnam but contradicts Mayer and Goldstein (1961), whose result indicated that there are circumstances where location could cause firm's growth to decline. This could happen if there is population relocation due to major developments where the area could be unsuited for the type of goods and

services offered or the same goods and services could already adequately be supplied by competitor firms established in the area. Another important service for firm's growth and smooth operation is access to credit. Garavito and Bermudez (2016), Mannathoko (2011), McPherson (1995), and Woldehanna et al. (2015) argued that access to credit helps small businesses to stay in operation. Our results also remained consistent with their findings. The hazard ratio suggests that the higher the firm's access to credit from the private, the lower (6.5%) the likelihood of graduation at any time compared to not having any access, ceteris paribus. Alternatively, the estimates from the AFT model confirmed that access to credit from the private bank increases the waiting time for micro graduation by 87.8%. In this regard, Astebro and Bernhardt (2003) investigated an unconditional correlation between having a bank loan and the survival of small businesses and found a negative relationship in the United States. Others (Nkurunziza, 2005; Astebro and Bernhardt, 2003); and argued that credit is helpful when it is accessible and reasonably priced, otherwise may have a negative impact.

The importance of the retained earnings in the firm's graduation is encouraging, with positive coefficients (hazard > 1) and statistically significant at the 1% level in both models. Accordingly, a one percent increase in working capital from the retained earnings, holding other variables constant, induced a 1.1% higher graduation chance and 6.5% for small enterprises. Using AFT model specification (Table 6) estimate additional retained earnings, on average, decreases the waiting time to small enterprise graduation by 2.8%. Generally, our findings are consistent with existing literature on MSE graduation often recognizes access to finance from borrowing or retained earnings, as important factors affecting MSE growth. For instance, lack of access to credit, insufficient loan size, time delay and collateral were cited as the main challenges of MSEs in Ethiopia (Ageba and Amha, 2006). To coup-up with the liquidity problem, MSEs used to resort into personal savings, iqub/idir, family and friends/relatives and at worst to informal institutions for credit mainly (Selamawit et al., 2014).

6. CONCLUSIONS AND RECOMMENDATIONS

Using the World Bank Enterprise database collected for Ethiopia in 2011 and 2015, the present paper has examined the determinants of graduation of MSEs and tried to estimate the average time required to graduate from one stage into the next stage (i.e., from micro into small and small to medium level. Cox PH, Weibull PH, and AFT models have been estimated.

Our findings confirmed that percent of manager's time spent in dealing with government regulations, managers' experience, business/system improvement, enterprise's location and internal funds/earnings were found to positively and significantly increase the likelihood of early graduation of micro or small firms. On the other hand, variables, such as degree of competition from informal/unregistered firms, employee's level of schooling, power supply shortage, access to land problem and

access to finance from private source increase the time to graduate. Similarly, managerial time, business location and internal fund were found to be instrumental for the success of small enterprise's growth.

The results of the paper have at least five important policy implications: The first is that, power supply and land shortage increase the time of graduation from one stage to the next stage. Improving access to power and facilitating land access reduces the waiting time before graduation. Second, access to finance was found to delay the growth of micro and small firms. Hence, any arrangement of financial credit to firms plays a significant role over the growth of small and micro firms. Third, it was found that the support provided by government and the efforts exerted to improve the business environment was encouraging. However, the government regulatory and business environment was found as basic challenge restraining MSEs' growth in Ethiopia. Policies focused to enhance government bureaucracy efficiency and business environment are recommended to speedup firms' growth. Forth, to speedup firm's graduation, more skill gap filling (based on actual need assessment) training on technology transfer and marketing, skills is crucial, as the formal education is not serving them in their day-to-day operation and thereby expediting their graduation.

Finally, the negative and highly significant impact of degree of competition from unregistered firms gives a strong signal to encourage informal sector and discourage formal sectors' growth. A policy that encourages formality and discourages informality should be put in place and in do so the overall government regulatory system should be streamlines accordingly so as to encourage formalization. The basic limitation of this paper is that it used a polled cross section data but a dynamic panel data would produce a rigorous empirical result. Further research using dynamic panel data is required.

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Received April 12, 2019, Revised August 19, 2020, Accepted January 07, 2021.