Export Survival of Manufacturing Firms in Ethiopia:Empirical Evidence

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Abstract

Even though many studies have been conducted on entry of new firms to export market, their probability of staying in foreign market has been given less attention. This study used panel data for manufacturing firms from 2006 to 2016 to analyze the patterns and determinants of export survival of exporting firms in Ethiopia. The empirical investigation has two parts: non-parametric and semi-parametric methods.

The non-parametric method analyzes the survivor function and the hazard (exit) rate of firms on the whole sample and by groups, while the semi-parametric analyzes a regression outputs based on the discrete-time model of proportional hazard model (Cox, 1972).

The result from the survivor function analysis shows that, at the end of the study period, the number of firms that survive in export market are more than 50%. Moreover, the result of the hazard rate reveals as the duration of time increases, the rate at which firms exit the export market decreases sharply. With regard to our semi-parametric analyses, we examine the factors that affect survival of manufacturing firms in international market and observed the direction of the impacts they have on the survival rates. The findings show that large and medium firms, firms that have higher productivity, export oriented firms, private owned enterprises, firms located in textile and garment industries, firms located outside Addis Ababa and firms categorized as importers have higher probability of staying in export markets than the others.

Key words: Export survival, Cox-model, Ethiopia

1 Introduction

In the 1980s many developing countries advocated Structural Adjustment Programs (SAP), oriented with the objective to eliminate existing levels of trade protection (Bigsten et al., 2009). As a result, a significant number of developing countries liberalized their economies with the objective of expansion and diversification of exports in manufactured and other forms of products. Since then, 1980s, it has been apparent to see that firms entering into the export sector in many of developing countries have been increasing over time (Shafaeddin, 2005). However, what really matters is not the number of new firms entering into the export sector. It rather is how long have those newly entering firms been surviving in the foreign market? The answer for this question is not easy as studies about export survival in developing countries, especially in Africa, are very scant. The existing large body of studies in the literature of industrial organization mainly focuses on the analyses of firms' survival in domestic markets since their establishments (see Bigsten and Gebreeyesus, 2008; Manjón-Antolín and Arauzo-Carod, 2008, among others).

The existing studies in the developing world indicate that export survival is characterized by lower rate. By way of example, Martincus and Carballo (2009) point out that low export survival rate is the main factor that hinders expansion of export growth in developing countries. (Besedeš and Prusa, 2006a) also add that less attention has been paid to the study of the risk of exit in international markets and this contributes for the lower rate of survival in the market in the developing world. Brenton et al. (2009) also suggest that export flows from developing countries undermined by high exit rates from export markets. Hence, it is necessary understanding not only the factors which determine the entry of firms to international markets but also the factors which make new exporters stay in export market after they start exporting their products (Brenton et al., 2010 and Brenton et al., 2012).

Coming to country specific, Ethiopia which is the case for this study, has placed significant effort in devising policies of manufacturing firms so as to increase industrial development and their exports. The government of Ethiopia has increased the policy emphasis on export-led-industrialization development and providing a number of motivating incentives for agents in the export sector of manufacturing industries in order to expand the amount of export flows. As a

result of these trade reforms a remarkable improvement in export entry and volume has been realized (Bigsten and Gebreeyesus, 2008; Abebe and Schaefer, 2013; Ohno et al., 2009). However, as Brenton et al. (2010) mentioned, it is important not only to understand the factors that derive firms entry into export market but also understanding the process by which exports are sustained in international market and its flow grow in volume. Hence, it is necessary to examine the survival of exporting firms in order to have insights of export growth.

After 2006, export survival studies have not been carried out for Ethiopian manufacturing exporters. This study aims to make an academic contribution by examining patterns and the determinants of export survival of Ethiopia's manufacturing firms. In particular, this study aims to make an in-depth exploration of the determinants of export survival of manufacturing firms and how these factors affects their sustainability in international market as export flows and export growth depends on sustainability of existing exports.

The rest of the paper is organized as follows: Section two discusses the related literature review and section 3 presents the methodology and data used in the study. Section four discusses the estimation results followed by section five which concludes and formulate recommendations on the basis of the research findings.

2 LITERATURE REVIEW

The empirical studies on survival of firms in export market started over the past few years. These empirical studies indicate that sustainability of exports is influenced by different factors. using a transaction level export data for Malawi, Mali, Senegal and Tanzania, Cadot et al. (2013) analyzed export survival of firms and they found that with increase in number of firms that export similar products, sharing the same destination and country of origin, increasing in number of products the firm produces and exports and surviving the first year of operation improves probability of stay in export market. Besedes & Blyde (2010), based on disaggregated manufacturing trade data, conducted a study to identify factors which affect export survival of manufacturing firms across countries and regions. The study found that ad valorem transport costs, the elasticity of import demand, partner quantity of purchase, language similarity between trading partners, having common national border, trade agreement between partners, larger

export volume and exchange rates depreciation are among the factors which affect export survival.

Another study by Freund & Pierola (2010) also analyzed the export survival of firms in non-traditional agricultural sector in Peru over the period 1994-2007. The study revealed that exporting firms will more likely to leave export market in their first year if volume of their start up export is small and vice versa. They also concluded that a new export product with high cost discourages new entry and will stay short time in export market. Similarly, Carballo & Martincus (2009) also study the performance of exporting firms in Peru from 2000 – 2006. Their study established that sizes of firms, location and level of product diversification affects export survival. Using detailed product level trade flows data for developing and developed countries Brenton et al. (2009) analyzed factors which affect export survival and their study found that export survival is affected by a broad range of product and country related factors such as trading partners relation in terms of cultural and geographic situation, size of market and experience. Similarly, using monthly firm level data, Stirbat et al. (2013) examine the export survival of exporting firms for Lao PDR from 2005 to 2010. This study also found that experience and networks are important elements for survival of firms in developing countries. Accordingly, they conclude that prior experience in exporting of the product, the existing network with importing partner, experience in using strategic relation with neighboring countries to start export are found to be positively contributing for survival in export market.

Moreover, Esteve-Pérez et al. (2007) and Fu and Wu (2013) examined export survival of manufacturing firms using firm level data for Spanish and China respectively. Those authors found that firm size, productivity, ownership and export intensity affects export survival of firms in foreign markets. According to their findings, large firms, firms with high productivity and foreign owned enterprises have high prospect of survive in export market.

While some studies on export survival of firms conducted in different economies, we have not found so far similar studies in Ethiopia. Motivated by the advantage such study has on export growth at country and firm level, we examined the patterns and determinants of export survival of manufacturing firms in Ethiopia by employing survival analysis methods.

3 METHODOLOGY AND DATA SOURCE

A Specifying Export Survival Models

Survival analysis is usually done based on nonparametric, semi-parametric or parametric models. Of these models, nonparametric analysis is often used to acquire the bird's-eye-view of the survival and hazard functions of the exporting firms. However, if we seek to examine thoroughly the pattern and determinants of the export survival of firms, we need to go beyond the nonparametric model and do the analysis with either the semi parametric model (proportional hazards model of Cox, 1972) or the parametric models (e.g. the exponential and Weibull). In comparison with these two models, the semi-parametric model needs no assumptions about the shape of the hazard over time. Hence, it makes sound to employ the Cox proportional hazards model of the semi-parametric model for survival analysis (see among others, Fu and Wu, 2013; Besedeš and Prusa, 2006b; Besedeš, 2008; Brenton et al., 2009; Fugazza and Molina, 2009).

Based on the logic denoted above, it is now imperative to specify the export survival model to be applied in this study. To begin with, say the hazard rate, or in this case the probability of a firm to exit from the export sector over the period of time [t, t + Δt), is provided by:

$$h(t|X_{it}) = h_0(t)\exp(X'_{it}\beta) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where $h_0(t)$ is baseline hazard, X is a vector of covariates that vary with time and β is a vector of coefficients to be predicted. This Cox proportional model is important to estimate the coefficients without specifying any functional form for the baseline hazard function so that the effect of explanatory variable is a parallel shift of the baseline function for all those firms that survive up to certain period of time in the export sector. However, there are some caveats of the Cox Proportional Model that deserve mentioned here.

Firstly, as the Cox model was basically envisioned for continuous-time data, applying it to a discrete-time data can lead to biased estimates. Secondly, the Cox model doesn't handle the problem of unobserved individual heterogeneity; hence there is a need to control for frailty to avoid spurious duration dependence and biased estimates. Thirdly, the basic assumption of proportional hazards in the Cox model is often less agreeable with trade duration data. For

instance, export duration dataset are on a yearly basis, indicating that Cox proportional hazards model for estimating the hazard function are not appropriate. This implies, we need to develop discrete-time duration model for our export survival analysis (see Esteve-Pérez et al., 2007 and Fu and Wu, 2013).

To specify it mathematically, let the interval of time be $I_j = [t_j, t_{j+1})$; where $j = 1,\ldots J$; d_j stands for the number of failure occurred in interval I_j; m_j represents for the number of censored spell endings occurred in interval Ij; Nj is the number of firms at risk of failure by the beginning of the time interval, while n_j is the number of spells at risk of failure at the midpoint of the interval provided as:

$$nj = Nj - \frac{mj}{2} \quad \text{.....(2)}$$

Given this, the estimator of the survivor function is framed as:

$$\hat{S}(j) = pr(T > j) = \prod_{k=1}^{j}\left(1 - \frac{dk}{nk}\right) = \prod_{k=1}^{j}(1 - hk) \text{.....(3)}$$

Where T stands the time span of export until exit time, hk stands the failure rate in the time interval I_j. It is important to notice that the export survival function embraces the likelihood of exporting beyond the year *j*.

As already mentioned previously, besides to the non-parametric part of the survival function, we also intend to examine the effect of observed covariates on the exit rate of the exporting firms. For that the discrete-time hazard rate of firm ***i*** in a certain period of time *[tj, tj+1)* conditional that its exporting life stays until the interval started*, can be written as:*

$$h_{ij} = p(T_i < t_j+1 \mid T_i \geq t_j, X_{ij}) = F(X'_{ij}\beta + \gamma_j) \text{.....(4)}$$

Where X_{ij} is a vector of covariates that may or may not vary with time; β is a vector of coefficients to be estimated. The sign of the coefficients is expected to affect the value of the hazard rate in opposite direction, while directly for the survival rate of the exporting firm. Whereas, γ_j denotes the interval baseline hazard rate and is a function of time $\gamma_j = \rho\ln(j)$ that permits the exit rate from foreign to differ across time for each firm. And more generally, the function F(.) stands for the distribution function, given that $0 \leq hij \leq 1$, for all *I, j*. However, there is still a need to specify a formal hazard function so that we shall able to estimate the model. To do so, we have introduced a right censored spell (ci = 0) and completed spell (ci = 1) to the log-likelihood function of the sample as:

$$LogL = \sum_{i=1}^{n} c_i \log(\frac{h_{ij}}{1-h_{ij}}) + \sum_{i=1}^{n}\sum_{k=1}^{j}(\log(1-h_{ij}) \quad \text{.....(5)}$$

This censored log-likelihood function of the total sample can also be rewritten in the form of binary panel regression model by formulating a limited dependent variable $y_{ij} = 1$ if the firm makes a transition (its spell ends) in year j and $y_{ij} = 0$ otherwise. This indicate that:

$$LogL = \sum_{i=1}^{n}\sum_{k=1}^{j}[y_{ij}\log h_{ij} + (1 - y_{ij}) + \log(1-h_{ij})] \quad \text{.....(6)}$$

Given this binary panel regression, the hazard rate h_{ij} is considered to follow a complementary log-log distribution or Cloglog (Prentice and Gloeckler, 1978, Wu and Fu, 2013):

$$h(X_{ij}) = 1 - \exp[-\exp(X'_{ij}\beta + \gamma_j)] \quad \text{.....(7)}$$

What is left to be mentioned is that we still need to control for unobserved heterogeneity of individual exporting firms. The justification for the need to add a variable to the model is because the variation in the hazard rate may not fully captured by the observed covariates of the specified model. If individual heterogeneity of firms is overlooked, it may lead inconsistent and biased estimates (see, among others, Jenkins, 2005; Brenton et al., 2009; Wu and Fu, 2013). To capture such unabsorbed heterogeneity of individual firm, we have reformulated the hazard model by adding heterogeneity or frailty variable (*vi*).

$$h(X_{ij}) = 1 - \exp[-\exp(X'_{ij}\beta + \gamma_j + V_i)] \quad \text{.....(8)}$$

Having modeling the export survival models in this way, we have explained in the following sub-sections the kind of data and explanatory variables to be considered throughout the study.

B Data Source

This study is based on Ethiopia's Annual Survey of Manufacturing Firms conducted by the Central Statistics Authority of Ethiopia (CSA) between 2006 and 2016. The data consists high quality information that enables us to examine thoroughly the patterns and determinants of firms' export survival in the context of the Ethiopian industrial sector. This is because first, it covers all manufacturing enterprises that represent the population of manufacturing firms in the country. Second, the data provides rich information on individual firms' characteristics on a yearly basis, such as the number of employees, output, export volume, ownership, type of industry and location, which are believed to be vital for identifying the factors influencing the duration of export spells. As the data were not organized in a panel form, we match the firms' data across

different years using the unique IDs to get a panel data during the study period so that it will be possible to examine their export survival over the ten years period (2006-2016).

C Choice of Covariates and Description

The covariates chosen for the survival models are based on prior expectation, review of the existing literature and the availability of information from the dataset. The list, definition and mean values of the main variables are presented in table1.

Table 1: Variable Definitions and Statistics

Covariates	Definition	Mean	S.E.
SIZE1	Large firms with the no. of employees>500)	.2805486	.4495476
SIZE2	Medium firms, 100<=employees< =500	.3142145	.3142145
SIZE3*	Small firms, employees<100	.40625	.4914395
LP1	LP belongs to productivity of the upper 1/3	.2285952	.4753834
LP2	LP belongs to productivity of the medium 1/3	.2136326	.4702076
LP3*	LP belongs to productivity of the lower 1/3	.5577722	.469293
EXPT1	export intensity>75%	.201995	.4017391
EXPT2	50%<=export intensity<75%	.0598504	.2373574
EXPT3	25%<=export intensity<50%	.0548628	.2278544
EXPT4*	export intensity<25%	.2817955	.4501549
SOE	state-owned enterprises	.3929912	.4887208
NSOE*	non-SOEs	.6070088	.4887208
IND1*	food industry	.180798	.3850909
IND2	textiles and garment industry	.1670823	.3732821
IND3	Footwear industry	.1259352	.3319833
IND4	Leather industry	.3391521	.473717
ADDIS	firm locating in Addis Ababa	.4837905	.500049
OTHERREG*	firm locating outside Addis	.5162095	.500049
IMPORT	Firms importing raw material	.7880299	.4089588
NOIMPORT*	firms not importing raw material	.2119701	.4089588
Log(t)	Logarithm of time	1.320178	.8369895

***** denotes the reference group in the multivariate analyses.

As it can be seen from the above table (Table 1) we grouped firms based on different criteria. We have grouped firms by size into three categories. Namely large, medium and small firms. We

categorize firms with number of employees greater than 500 as large firms, firms with number of employees between 100 and 499 as medium firms and with less than 100 employees as small firms. Large firms may have an advantage of economies of scale over small and medium sized firms that make them more competitive in the external market.

Productivity is also believed to have a positive impact on the survival rate of firms in the international market. We categorized firms by productivity as high, medium and lower productivity firms. We expect firms with highest productivity to be more profitable and to survive longer in export market than firms with low productivity. Furthermore, we divide the firms into four categories according to their export intensity and we expect volume of trade affects export duration positively.

Ownership is also another factor expected to have impact on survival of firms in foreign market. Based on the data we have, we classified firms into private owned and public owned firms.
As a proxy for measuring the heterogeneous characteristics of products we grouped firms into four industrial sectors, namely, Food (IND1), Textiles and garments (IND2), footwear (IND3) and leather (IND4). Here we include three industry dummy variables and the food industry is considered as the base group. The regional location may also affect export survival of a firm. To account for this effect, firms are divided into two. Namely, firms located in the capital city of the country (Addis Ababa) and firms located outside the capital city and include region dummy variables to capture the firms' location. With regard to the source of raw materials, we also created a dummy variable for firm that imports raw materials from foreign market. Finally, In addition to the dependent variables just described above, we have also included a time variable to capture the pattern of duration dependence, defined as the *log of time duration.* Having specified the export survival model and described the variables needed for this study, we then present the empirical result of those models in the following section.

4 Results and Discussions

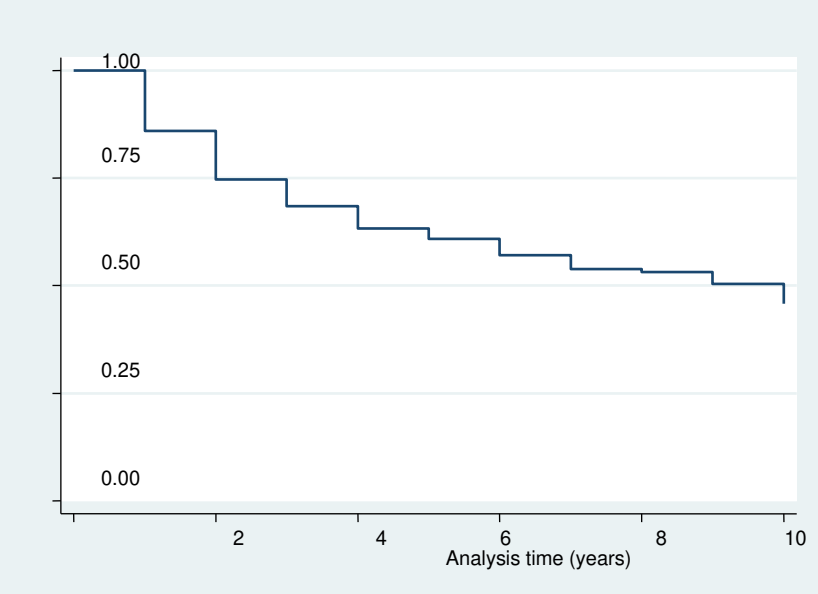
In this section of empirical analysis, we present the results of the analysis using the two widely-used methods for survival analysis: non-parametric and semi-parametric analysis. We begin with the non-parametric analysis:

A Non-Parametric Analysis

The pattern and trends of the survival estimates and hazard rates of the Ethiopian exporting firms are presented graphically both by total sample and group of the exporting firms.

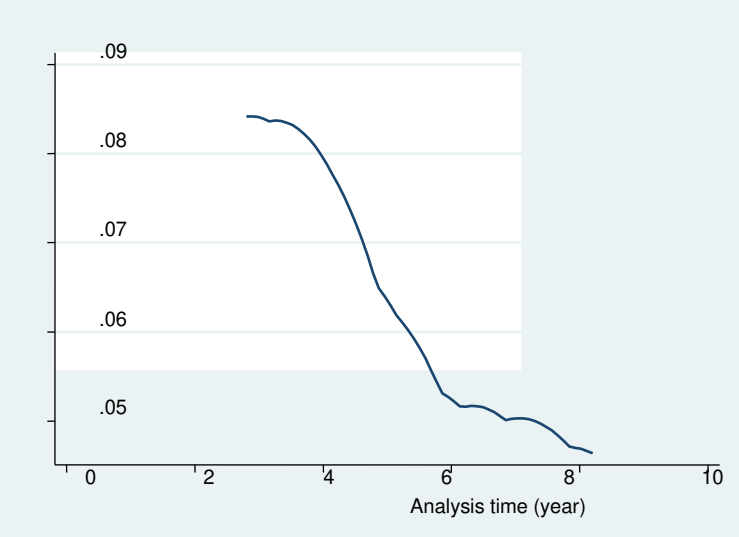
Figure 1 presents the Kaplan-Meier survival estimate of the total sample, and what we can observe from the available graph is that the survival rate of the firms is above 50% even at the end of the study period. This can be seen from the estimate value, where it is still above 0.5 by the end of the sample year (2016). The implication is that exporting firms in Ethiopia do not cease exporting quickly, at least under the consideration of time, 2006-2016.

Figure 1: Kaplan-Meier survival estimate



The high survival rate can be also ascertained by thoroughly examining the hazard rate of the exporting firms of the same period. In figure 2, it appears to observe that the smoothed hazard estimate has a negative dependence, implying that along with time the exiting rate of Ethiopian exporting firms from the international market declines sharply.

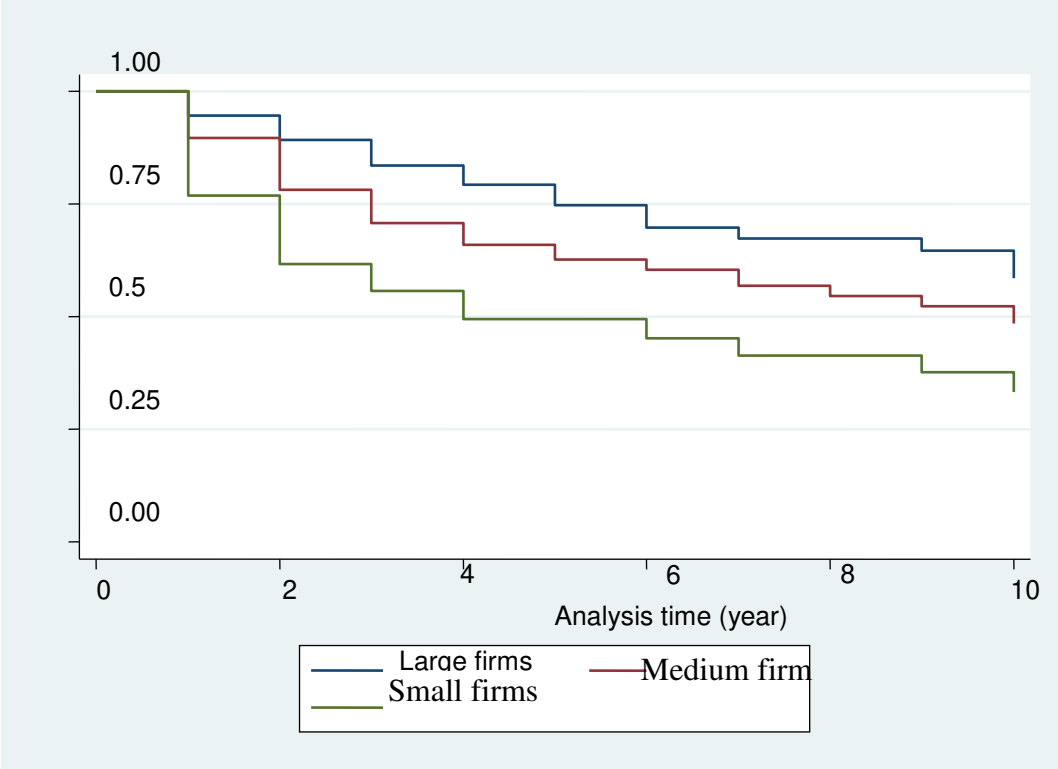
Figure 2: Smoothed hazard estimate



It is possible to mention few points that can attribute for such low exit rate in the Ethiopia context. First, the Ethiopian government has been proactive and consistent to encourage firms that do export to the international market. It has been very common to see that a wide arrays of tax breaks and holidays have been given for exporting firms so that they will bring hard currencies to the Ethiopian economy. The Ethiopian government has been very committed to create good investment climate throughout the country so that firms will participate in the external market. On the other side, the financial and economic crisis that came to happen in the advanced economies has relatively little effect in the Ethiopian economy. This is so more because most of the export items from Ethiopian firms to the advanced economies are unfinished and semi-finished products. Hence, as the exports items from the Ethiopian firms are inputs for most of the external (foreign) firms, the demand for their products may not show dramatic changes along with the financial and economic crisis in the advanced economies.

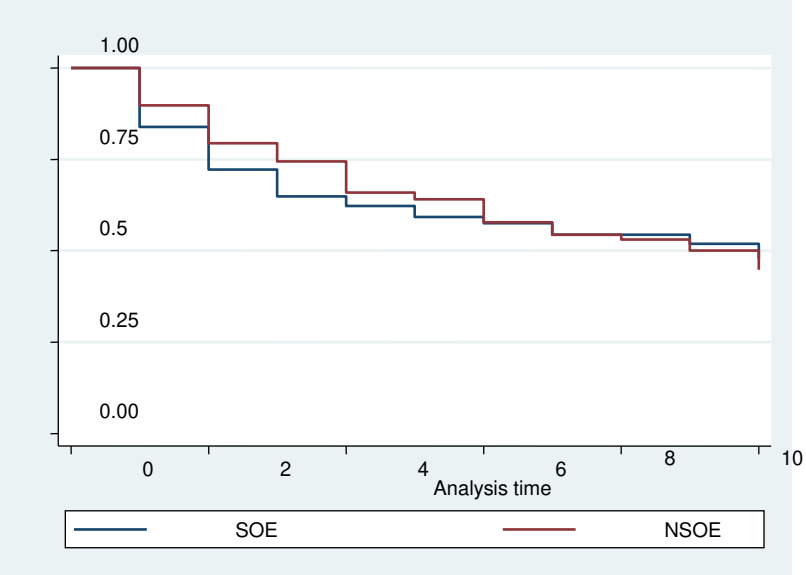
In addition to the aggregate evaluation of the export survival and hazard rates of the Ethiopian exporting firms, it is also imperative to examine the difference that may exist across groups of firms. In doing so, we have presented the survival function curve by firm size in figure 3. From this figure, we observe that firm size matters. The result shows there is higher survival for large and medium firms than small firms at any time over the ten year of sample.

Figure 3: Kaplan-Meier survival estimates, by firm size



With regard to ownership difference of survival rates (as shown in figure 4), state-owned enterprises lasts shorter in international market than private-owned exporting firms do in Ethiopia. Although it is not such an easy to talk the exact factors as to why the private-owned exporting firms do have higher survival rate than the state-owned firms, it is possible to presume that private firms may work strongly, efficiently and effectively to survive in international market than state owned firms. However, the difference in survival of the two groups is not that much high.

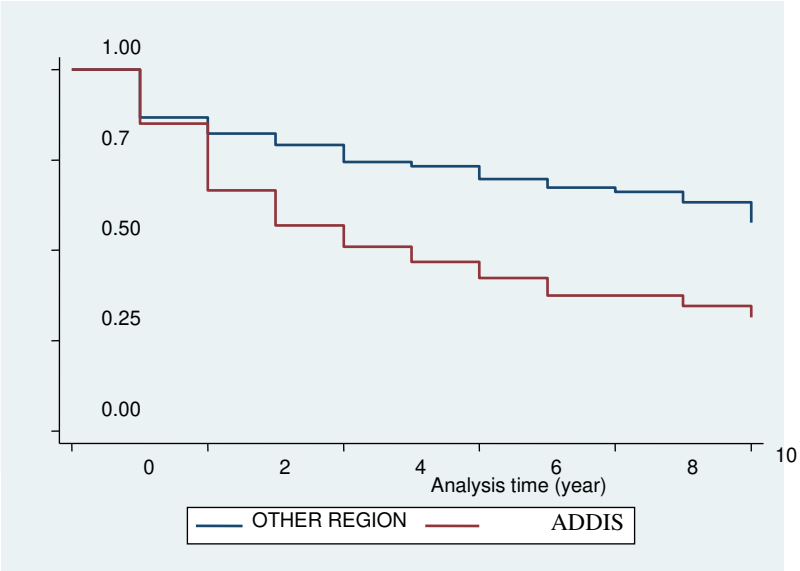
Figure 4: Kaplan-Meier survival estimates, by ownership



With respect to the differential effect of location (figure 5), we find an unexpected result. In a priori, we have expected that firms located in Addis Ababa, which is the political and economic capital of Ethiopia, to exhibit higher survival rate than the exporting firms located in other regions of the country. This expectation was originated from the fact that firms located in Addis Ababa might take the advantage of better institutional services in the city that make them more profitable to stay in the international market. However, this is not the case we observe from the graphical illustration, but the opposite. Firms located outside Addis Ababa seem to have higher survival rate than firms stationed in Addis Ababa. Although it is not easy to pinpoint the factors associated with such kind of unexpected result, we can say that in spite of the better labor supply available in Addis Ababa, the wage payment for employees can be higher by firms in Addis Ababa than the one given to by firms in other regions of the country. It is important to mention that wage is one of the most vital factors that determine the profitability level of firms. If firms in Addis Ababa are asked to pay higher wage, they can't be profitable, and if they aren't profitable, there is less chance of staying in the external market. Another possible reason could be the fact that firms located in Addis Ababa do not have comparative advantage over access to the port of Djibouti, which is the main gate for the Ethiopian export items to the external market. As Addis Ababa is located in the center of the country (around 1000KMs away from port of Djibouti),

firms located in eastern and southern part of the country might have better transportation cost of materials to the port of Djibouti that enable them to survive better than the ones in Addis Ababa.

Figure 5: Kaplan-Meier survival estimates, by location



To conclude the non-parametric analysis, it is vitally important to carry out the ***Wilcoxon test*** of equality of survivor functions across groups of firms. This test helps us ascertain the difference in export survival rate across group of firms we have seen above. As reported in table 2, the existence of significant differences in survival rates of the groups considered. It is only the effect of ownership that is slightly insignificant at 10% significance level, which needs to be checked taking the explanatory variables in the full regression equations of the semi-parametric analysis.

Table 2: Wilcoxon (Breslow) test for equality of survivor functions, p value in parenthesis

Firm size	57.17 (0.0000)
Ownership	2.34 (0.1263)
Region	40.6 (0.0000)
Raw material	45.15 (0.0000)
Industry	80.08 (0.0000)

B Semi-parametric analysis

To deal with the semi-parametric analysis of this study, we estimate three discrete-time duration models. These estimated discrete-time models are the hazard rates with complementary log-log (*cloglog*) form (see Hess and Persson, 2010 and Wu and Fu, 2013). This hazard rate is in place of the hazard rate from continuous-time proportional hazard model.

Aiming to identify the appropriate proportional Cox (1972) model for this discrete-time hazard rate, we then run three models that take different factors into account, such as unobserved heterogeneity and duration dependence of each firm. In the augmented *cloglog model,* unobserved heterogeneity is checked for its existence by assuming either normal or Gamma distribution.

For comparison purpose, the estimation results from the three models are presented below separately. **Model 1** presents the hazard ratios without duration dependence and individual heterogeneity, while **Model 2** takes into account the duration dependence by including the variable *log of time duration* of each firm. **Model 3** considers both duration dependence and *frailty* in which frailty assumed to have normal distribution**.**

The first lesson we can drive form **Model 2** is that there is negative duration dependence in the data. This is manifested by the fact that the sign of the hazard ratio for *logt* is less than one in particular, and the magnitudes of the whole parameters are much larger than that of those in **Model 1.** Such result of the duration dependence implies that retaining the time variable (log time) in the export survival model is an important element. This is because the influence of other covariates on the hazard rate would be underestimated if we had not controlled for the patterns of duration dependence in the model.

With regard to the unobserved heterogeneity of each firm in **Model 3**, the likelihood-ratio test of normal distribution variance reveals that we fail to reject the null hypothesis that there is no unobserved heterogeneity. This implies that it is inappropriate to consider unobserved heterogeneity in our analysis, at least in this semi-parametric analysis of the export survival model. Hence, the interpretation we present from this discrete-time hazard model of the semi-parametric analysis is entirely based on **Model 2**. As shown in **Model 2**, the effects of the explanatory variable on the hazard are provided by the *hazard ratios.* While a hazard ratio greater than one implies the explanatory variable has a positive impact on the exit rate of a firm from the international market, a hazard ratio less than one indicates negative effect on the hazed rate of the exporting firm, *other thing remaining constant*. In this way, the smaller is the hazard ratio the smaller is the exit rate, but the longer is survival rate of exporting firm. Moreover, a unit

change in an independent variable, or a shift from 0 to 1 for dummies, results in a proportional shift in the conditional probability of the exit rate of the exporting firm.

More specifically, to analysis the effect of firm size on the hazard rate we take small firms with number of workers below 100 as a benchmark and interpret the hazard ratio of the large and medium size firms by referring to this small size firms. As seen at the first row of **Model 2**, the hazard ratio for SIZE1 is .4739. The implication of this hazard ratio is that large firms, in the context of Ethiopian economy with more than 500 employees, are estimated to encounter an exit rate that is only 47.4% of the hazard faced by small firms. In a similar way, medium firms, again in the context of Ethiopian economy with employee between 100 and 499, are predicted to encounter a hazard rate of only 63.2% of hazard faced by small exporting firms. Both hazard ratios are also statically significant with p-value 0.000.

Another important covariate is labor productivity. We include the productively level of the exporting firms and the result shows that productivity affects the exit rate negatively. The estimated probability is that firms with the highest level of productivity face 27.3% of less exit rate than firms do operate with the lowest productivity level. The implication of such result is that productivity of firms is curial not for their export decisions only, but also for their survivals once they start exporting to the external market. We also find a negative impact of increasing export intensity on the hazard of the exporting firms, meaning the probability of exit for firms with more than 75% of their sales exported (EXP1) is about 90.84% lower than that for firms with export intensity less than 25% (EXP1). This estimates is similar to the outcomes reported by Esteve-Pérez *et al.* (2007) for Spain and Wu and Fu (2013) for china, indicating that being more export-oriented firm seem to work in both the developed and developing world. Those authors further reasoned out that being more export-oriented firm gives a better exposure to foreign markets, channels of exporting, and to preferences and testes of foreign buyers.

As to the effect of ownership, it seems that public-owned firms seem to survive lower than private owned exporting firms. Even though the result is not statistically significant, it shows being state-owned exporting firm is 80% more likely to leave the export sector than being a private-owned exporting firm. This result is similar to the findings from Wu and Fu (2013), who

found that state-owned enterprises have lower export spells and 29.7% more likely to exit than private owned firms in the Chinese export sector.

We also investigate whether there are sector and location effects on export survival. In terms of category by industry sector, we grouped the whole sample firms into food industry, textile and garment industry, footwear industry and leather industry so that we are able to see any differential effects by this industry sector. But we don't find any significant differential effect. The estimated hazard ratios of all industries are greater than one except for textile and garment industry (IND2), suggesting that firms operate in textile and garment seem to have better survival prospects than those in food industry. But, in general terms, the overall result from the industry sectors are less helpful to infer meaningful differential effect since all the hazard ratios are *statistically insignificant* (p-value > 10%).

With respect to the location effect, the unexpected impact of location between Addis Ababa located firms and other regions is also confirmed when covariates are included in the model. In magnitude terms, firms stationed in Addis Abba face 13.6% more likelihood of exit rate from external market than firms located outside Addis Ababa. As mentioned in the non-parametric analysis, though at first firms from Addis Ababa were expected to show lower exit rate, this expectation was not able to meet from the data analysis. It is a bit difficult to say precisely why this is so, but it is still possible to say little based on the institutional environments and location of advantage of the other firms to the port of Djibouti. It is not then surprising to find that firms located in Addis Ababa (central Ethiopia) may have lower export survival than firms located in eastern, and southern part of the country. Indeed, firms located in Addis Ababa may pay higher wages to their employees, beyond the relative higher transportation cost of raw materials and products to (or from) the port of Djibouti than firms located in eastern part of the country, like Dire Dawa, Harer and other towns.

We have also tried to examine if there is any differential impact of importing raw materials from abroad. The hazard ratio is statistically significant and it seems that those importers have more export spells. Numerically, importers are 27.5% less likely to exit the external sector than non-importers. This advantage might stem from the fact that importers have better exposure to foreign markets, in which they acquire important raw materials for their products; and advanced technologies that make them be competitive in the foreign market. Last but far to be least, we

also incorporate the *log of time duration* in the model and the hazard ratio is found to be less than one and statistically significant. Particularly, we found that as a firm stays one year longer in the export sector, its survival in the international market increases by about 50% in the coming year. This shows exporters with longer exporting duration tend to export continuously. The first possible explanation is that exporters are less likely to cease exporting as accumulated sunk costs increase over time. And if they leave the export sector they will face a higher re-entry cost (Wu and Fu, 2013). And another reason is that firms may learn by exporting and hence improve their productivity performance. The more the firm stays in the export sector, the longer it survives in the international market. It is just like "learning-by-doing" helps to survive longer in the international market.

Table 3: Estimates of the discrete-time proportional hazard models

	Model 1		**Model 2**		**Model 3**	
	Hazard Ratio	**P-Value**	**Hazard Ratio**	**P-Value**	**Hazard Ratio**	**P-Value**
SIZE1	.2738187	0.000	.4739772	0.000	.4739879	0.000
SIZE2	.5157819	0.000	.6321223	0.004	.6321353	0.004
LP1	.4914407	0.000	.7274204	0.094	.7274304	0.094
LP2	.8174769	0.199	1.049861	0.768	1.049856	0.768
EXP1	.0915727	0.000	.1022113	0.000	.1022127	0.000
EXP2	.044818	0.000	.0490613	0.000	.0490622	0.000
EXP3	.0477347	0.000	.0576223	0.000	.0576229	0.000
SOE	1.51597	0.004	1.800714	0.000	1.800688	0.000
IND2	.8694978	0.462	.8988921	0.585	.8988978	0.585
IND3	1.028628	0.886	1.173181	0.420	1.173174	0.420
IND4	.7549071	0.121	1.08196	0.680	1.081942	0.680
ADDIS	1.242094	0.149	1.136101	0.392	1.136095	0.392
IMPORT	.6629754	0.003	.7249528	0.027	.7249496	0.027
_cons	2.578774	0.000	3.067023	0.000	3.067082	0.000
Logt			.5002748	0.000	.5002707	0.000
P-value of LR test for RE						= 0.496

To understand the direction of the impact of covariates on the hazard rate, we can look at the coefficients of the regression output. Table 4 shows the estimated coefficients of the discrete-time proportional hazard model. A coefficient with negative sign suggests that a firm with that characteristic face high probability of survival and less hazards. This implies positive coefficient means the covariate increases the probability of exit or hazard. Moreover, a larger absolute value suggests the greater magnitude of the effect of the covariate on the hazard rate. Firms with larger size, higher labor productivity and greater export intensity endure less risk of exit in the export

markets. State owned enterprises and firms who works in all industries except textile and garment face higher hazard and have shorter export durations. Moreover, firms locating in Addis Ababa face less survival prospects and importers of raw material have high survival probability. In general most of the covariates have negative effect on the hazard rate of firms.

Table 4: Estimates of the discrete-time proportional hazard models

	Model 4		Model 5		Model 6	
	Coef.	**P-Value**	**Coef.**	**P-Value**	**Coef.**	**P-Value**
SIZE1	-1.295289	0.000	-.7465961	0.000	-.7465734	0.000
SIZE2	-.6620712	0.000	-.4586723	0.004	-.4586519	0.004
LP1	-.710414	0.000	-.3182507	0.094	-.318237	0.094
LP2	-.2015326	0.119	-.0486575	0.768	.0486527	0.768
EXP1	-2.390622	0.000	-2.280713	0.000	-2.280699	0.000
EXP2	-3.105145	0.000	-3.014685	0.000	-3.014667	0.000
EXP3	-3.042098	0.000	-2.853845	0.000	-2.853835	0.000
SOE	.4160558	0.004	.5881831	0.000	.5881687	0.000
IND2	-.1398395	0.462	-.1065922	0.585	-.1065859	0.585
IND3	.0282257	0.886	.1597185	0.420	.159713	0.420
IND4	-.2811605	0.121	.0787745	0.680	.0787575	0.680
ADDIS	.2167989	0.149	.1276024	0.392	.1275967	0.392
IMPORT	-.4110174	0.003	-.3216488	0.027	-.3216532	0.027
_cons	. 9473139	0.000	1.120707	0.000	1.120726	0.000
Logt			-.6925978	0.000	-.6926058	0.000
P-value of LR test for RE						= 0.496

5 Conclusion and Recommendation

This study employed non-parametric and semi-parametric methods to examine the patterns and determinants of export survival of exporting firms in Ethiopia. The non-parametric method analyzes the survivor function and the hazard (exit) rate of firms on the whole sample and by groups, while the semi-parametric analyzes a regression outputs based on the discrete-time model of proportional hazard model (Cox, 1972).

The results from the survivor function analysis show that the number of firms that survive in export market as time goes does not decrease rapidly. Moreover, the result of the hazard rate reveals as the duration time increases, the rate at which firms exit the export market decreases rapidly, indicating that the result from the hazard rate confirm the popular finding that “exporting firms face high risk of exit in their starting years”.

In addition to the overall survival function and exit rates, this non-parametric analysis is used to examine whether different group of firms have different survivor function. And the results reveal that different groups of firms have different survivor functions. The results are statistically robust as confirmed by Wilcoxon test for equality of survivor functions of group of firms.

With regard to our semi-parametric analyses, we examine the factors that affect survival of manufacturing firms in international market and observe the direction of the impacts they have on the survival rates of exporting firms. The impact of selected variables, namely size of firms, productivity, export intensity, ownership, type of industry, import of raw material and location are fully studied.

The main findings show that large and medium firms have higher probability of staying in export market than small firms. With regard to productivity, firms that have higher productivity have higher survival probability than firms who have low productivity. Moreover, export intensity also has positive effect for survival probability with higher export intensity would continue to export for a longer period. The finding on the impact of ownership on export survival shows that state owned enterprises are more likely to exit export market than private owned enterprises.
Further, the result of the comparison of export survival of firms in different industries indicate that firms located only in textile and garment industry have lower exit rate than firms in food industry. Finally, we compare the hazard rates for firms located in Addis Ababa and other regions and raw material importers and non-importers. It is found that firms located in Addis Ababa and firms categorized as non-importers have faced higher risk of exit rate than others.

In a nutshell, the findings reveal that increasing the number of exporting firms may not bring increasing the volume of export flows unless the determinants of sustainability of export flows are fully studied and an appropriate trade policy is framed. In this way, this study concludes that export survival rates of firms in Ethiopia are influenced by various factors that can be grouped as firm characteristics and industrial location, suggesting that a policy that is directed to increase export through increasing the number of exporting firms should not only focus on the number of exporting firms but should also be all round in addressing the factors that affect export sustainability, such as firm characteristics, ones firms start exporting of their products.

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