

# **Determinants of Export Survival: The Case of Ghanaian Manufacturers**

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## **Abstract**

This paper uses the survival analysis technique to investigate the factors that affect the export survival of Ghanaian manufacturing firms. The study uses a panel data set obtained from the survey conducted by the Centre for the Study of African Economies (CSAE), the University of Oxford, the University of Ghana, Legon and the Ghana Statistical Office known as the Regional Programme for Enterprise Development/Ghana Manufacturing Enterprise surveys. The dataset spans from 1991 to 1998. The findings of the study suggest median duration of 5-6 years for Ghanaian manufacturing exporters. It is also revealed that the longer a firm remains exporting, the greater the likelihood of survival in exporting. Other factors including firm age, size, and export intensity each enhance the probability of firms surviving in export markets while exporting a final product reduces the probability of survival.

**Keywords:** Survival analysis, export survival, Ghanaian manufacturing firms, panel data, median duration.

## 1. Introduction

Recent literature on international trade suggests that maintaining and prolonging export relationships, after they have been created, is an important condition for export success. Some researchers have argued that the main reason for the lack of export growth among developing countries is their inability to maintain export relationships for long periods (Besedes & Blyde, 2010). Prolonged export relationships are important two reasons. Firstly, it is a sure way to increase exports of existing products with existing trade partners (Fugazza & Molina, 2009). Secondly, it results in efficiency gains for the exporting firms<sup>1</sup>. Such gains in efficiency are likely to have positive implications for aggregate export performance and industrial growth.

Until recently, the issue of trade duration was ignored both in theoretical and empirical literature (Fugazza & Molina, 2009). Most trade models implicitly assume that trade will persist once it is established. This is quite surprising given that most of the empirical findings on trade relationships for developing countries suggest short-lived trade spells. For instance, Besedes and Prusa (2007) in a study of manufacturing exports of 46 developed and developing countries showed the median survival period to be just 1-2 years. Likewise, Cadot, et al. (2010) found that only one out of five new export relationships from Malawi, Mali, Senegal, and Tanzania survive the first year.

There is no specific study on trade relationships and/or duration for Ghana. However, available findings suggest high failure rates for Ghanaian manufacturers domestically. For instance, CEPA (2000) reported that enterprise failures increased by 80% between 1995 and 1999, consistent with Association of Ghana Industries' report of a decline in its membership from 1,500 to 500 over the same period. Given these quite alarming statistics, it will be interesting to investigate how exporting firms fared during this period.

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<sup>1</sup> See Biesebroeck (2004)

Data from the Regional Program on Enterprise Development surveys<sup>2</sup> on manufacturing firms in Ghana revealed some important details about the exporting behaviour of Ghanaian manufacturing firms. Out of about two hundred (200) firms that participated in the first wave of the surveys in 1991, only eighteen (18) were exporters. By 1998, only seven (7) of the 18 exporters were still exporting; eight (8) had stopped exporting while three (3) had stopped responding to the survey. The year 1997 recorded the largest number of failures with twelve firms exiting from export markets. Overall, ten (10) firms had one-year complete single exporting spells, excluding all exporters who entered in 1998<sup>3</sup>. Nine (9) firms had two-year complete single exporting spells<sup>4</sup>. Only two firms that began exporting in 1991 continued to export each year until the end of 1998. Similarly, three firms that began exporting in 1993 did so regularly until the end of 1998.

It could be deduced from the above details that relatively few firms export manufactured products from Ghana<sup>5</sup> and this probably explains why aggregate export of manufactured goods from Ghana is relatively insignificant<sup>6</sup>. Another implication is that Ghanaian manufacturing firms that export do not survive long in export markets, thus limiting the benefits of exporting to the firms and also limiting the growth of manufactured exports from Ghana.

It is thus clear that a study on trade duration and survival is essential for Ghana, with the view to making recommendations that will ensure an effective promotion of entry of

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<sup>2</sup> See section four (4) for a detailed discussion on the dataset

<sup>3</sup> The firms that started exporting in 1998 would obviously have one-year exporting spells given that the survey ended in 1998 and would not be counted as failures because their spells had not completed before the survey ended

<sup>4</sup> Excluding two firms that had started exporting in 1997 and were still exporting by the end of 1998

<sup>5</sup> I assume the outcome of the research could be generalized though the survey is not a census

<sup>6</sup> This is further corroborated by the discussion on manufacturing exports in chapter two

more manufacturing firms into international markets and more importantly to sustain their stay in those markets. This is because it is clear from empirical findings that the best indicator of good performance in international markets is prolonged export survival.

This study seeks to fill the knowledge gap by analyzing the impact of firm, industry and export markets' characteristics on export survival of Ghana's manufacturing firms. It does so by applying duration models of the survival analysis technique. The paper uses a panel data of a sample of Ghanaian manufacturing firms that export, obtained from the Regional Program for Enterprise Development surveys.

As per the export-led growth hypothesis, export growth is supposed to enhance economic growth. To achieve this improvement in export performance, there is the need to transform the structure of the export sector in a way that gives prominence to value added products over primary products. This implies that both intensive and extensive margins<sup>7</sup> for manufactured products must be achieved for the export sector to grow. However, empirical evidence suggests that Ghana is one of the poor performers in sub-Saharan Africa with regards to export of manufactures (Teal, 1999). Given that the main driver of the intensive margin is the length of export relationships, it is necessary to give special attention to the length of export relationships if trade expansion through the intensive margin is to be achieved. This study thus becomes relevant as it will not just provide the approximate length of time Ghanaian manufacturing firms last in export markets but will

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<sup>7</sup> Trade expansion can occur through two means: the intensive and the extensive margin. With the intensive margin, countries increase exports of existing products with existing partners and with the extensive margin, countries increase their exports by either introducing a new product in a new market, an existing product in a new market or a new product in an existing market (Fugazza and Molina, 2009).

also give an indication of the factors that influence the length of their stay in those markets.

The survival analysis technique has gained popularity in recent times, especially in the study of international trade relations at firm and product levels. However, no known country-specific study on Ghanaian firms in export markets has used this methodology. Thus, the findings of this study will be a valuable addition to knowledge and more importantly a source of reference for policy makers.

A limitation of this study is that the dataset used for the estimation did not include the specific destination markets (countries). It only included two categories (Africa and the rest of the world). Thus, it was impossible to include some variables such as the size of the destination country, distance, country risk, etc.

The paper is organized in six sections. Section two discusses the theoretical and empirical literature on survival of firms in industries and in export markets. Section three presents the econometric method used in the analysis of firms' survival in export markets and the choice of the relevant explanatory variables. In section four, the paper takes a closer look at the data used and then the summary statistics. Section five presents and discusses the results from the model estimation, and undertakes a sensitivity analysis to check for robustness. Section six contains the conclusion and recommendations to policy makers.

## **2. Theoretical Framework**

### **2.1 Passive and Active Learning Models**

Propounded by Jovanovic (1982), the passive learning theory suggests that firms discover about their efficiency only after they begin to operate in an industry. It argues that whether a firm belongs to an industry or not is an inherent characteristic that is can be

discovered through experience. Thus, firm entry and exit can be described as a natural selection process or a process in which only the fittest firms survive.

The active learning model, developed by Ericson and Pakes (1995), relates firms' growth and survival prospects to their participation in productivity-enhancing activities. According to this theory, a firm's suitability to a given industry changes during its term in the industry. This change is motivated by the successful completion of a research and development (R&D) project, development and successful marketing of a new product, hiring a success-driven manager or raising workers' morale. A change driven by any of these factors will be favourable to the firm's suitability and hence will prolong its stay in the industry. Otherwise, the firm will exit. Thus, this theory ultimately predicts a continual entry and exit even if industry is stable over time.

The predictions of both the passive and active learning theories imply that age and size are positively related to export persistence. Krugman (1980 and 1984) argues that the positive relationship between firm size and export persistence is due to economies of scale advantage that larger firms enjoy over smaller firms. The above argument is further supported by Bonaccorsi (1992) who argues that small firms are disadvantaged in terms of exporting because: they have limited resources in terms of management, finance, research and development, and marketing; they have limited or no economies of scale in manufacturing and export marketing; and the existence of the perception of high risk in international activity.

Again, both theories suggest that the risk of exit from export markets reduces over time. Thus, the longer a firm remains an exporter, the lower the probability that that firm will exit the export market. This is supported by suggestion that firms that enter foreign markets incur high sunk entry costs (Dixit, 1989a). These costs relate to researching

foreign demand and competition, establishing external links, effecting changes to products and packaging characteristics to meet foreign demand and so on. Again, exporting firms incur updating costs related to changing market and distributional channels, adapting of products to new export environments and so on. These updating costs contribute to the firms' accumulation of knowledge from international buyers and from competitors as well, which improves the performance of these firms and increases their chance of survival in export markets (Esteve-Perez, Manez-Castillejo, Rochina-Barrachina, & Sanchis-Llopis, 2007). Manez-Castillejo, Rochina-Barrachina and Sanchis-Llopis (2004) suggest that knowledge acquired by a firm through exporting depreciates rapidly once that firm stops exporting. Thus given all the costs that firms incur by exporting and the possibility of losing (over a short period of time) the expertise they acquire through exporting when they exit exports markets, firms are likely to persist in their exporting behaviour.

The active learning theory suggests that firms that have high intensity of research and development activities are more likely to survive in export markets than those with lower R&D intensity. This is because, as Kleinschmidt and Cooper (1990) and Kotable (1990) argue, R & D activity (if successful) enhances firms' competitive advantage and thus will enhance their export survival chances. Esteve-Perez, et al. (2007) further suggest that R&D intensity is a proxy for product differentiation and given that firms selling high quality products have higher unit profits, they are more competitive and thus will tend to have longer export spells.

Finally, productivity in itself influences survival prospects of firms in export markets. Audretsch (1991, 1995) conceptualizes that the probability of any firm surviving in an industry is dependent on the firm's price-cost margin. Given that increase in productivity of a firm causes the firm to produce at a lower average cost for a given level of production which in turn increases its price-cost margin, then it holds that more



productive firms are more likely to survive than less productive ones. Moreover, given that productivity is highly related to differences in competitiveness of firms, only more productive firms will be in a better position to face strong competition in international markets and thus will be more likely to survive.

## **2.2 Empirical Literature**

In recent times, there have been few studies that have used the survival analysis technique to study the nature of trade durations and the effects of firm, industry, and export market characteristics on the survival of firms in export markets.

In terms of the length of trade relationships, Besedes and Prusa (2004), using data on U.S. imports, revealed that trade relationships were short-lived with the median duration being on the order of two to four years. Volpe-Martincus & Carballo (2008) also found that the median trade duration for new Peruvian exporting firms was just one year. Interestingly, while Esteve-Perez, Manez-Castillejo, et al. (2007) found that the median export duration of Spanish manufacturers is ten years, Esteve-Perez, Pallardo, & Requena (2008), in a different study<sup>8</sup>, found it to be just two years.

For most of the studies, their findings- especially with respect to factors that influence export survival- are consistent with theory. Studies by Esteve-Perez, Manez-Castillejo, et al. (2007) and Esteve-Perez, Pallardo and Requena (2008) both found that the longer a firm stays an exporter the lower the risk of exit. The positive relationship between size and export persistence has been confirmed by Esteve-Perez, Manez-Castillejo, et al.

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<sup>8</sup> focusing on firm-country trade relationships

(2007), Esteve-Perez, Pallardo and Requena (2008) and Volpe-Martincus and Carballo (2008). Again, Esteve-Perez, Pallardo and Requena (2008) and Volpe-Martincus and Carballo (2008) confirmed that older firms survive longer exporting spells than younger firms. Other factors found to positively affect export survival include productivity, export intensity, export of final consumer goods, and exporting to countries that are geographically closer or are within the same regional block with the exporting firm's country<sup>9</sup>.

### **3. Empirical Methodology**

#### **3.1 Econometric Method (Survival Analysis)**

Survival analysis is a technique that models time until an event occurs, given a set of covariates. The subject of analysis for this study is a Ghanaian firm that exports manufactured goods. Thus, we model the exit of these manufacturing firms from export markets given survival up to a certain time. The export survival data available is organized in a discrete (annual) form, though it may be continuous in nature. Thus, the study will use the discrete time methods to model survival times, where it will treat survival times as been banded in discrete intervals of time (in this case numbers of years).

Time takes only positive integers  $t = 1, 2, 3, \dots$  and the interval  $t$  is  $(t-1, t)$ . A total of  $n$  independent firms ( $i = 1, \dots, n$ ) are observed with the observations beginning at some starting point  $t = 1$ . The observation continues until  $t_i$ , at which point either the firm experiences an exit from exporting or is censored.

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<sup>9</sup> See Esteve-Perez, Manez-Castillejo, et al. (2007)

There is a dummy variable  $c_i$  that is equal to one if exporter  $i$ 's exporting spell is complete and zero if right-censored. There is a vector of explanatory variable/covariates,  $X_{it}$ , which may take on different values at different discrete times. At each point in discrete time, there is only one value for each of the explanatory variables.

The discrete-time hazard rate,  $h_{it}$ , which is the probability that a firm exits exporting at time  $t$ , given that it has not yet exited, is specified as:

$$h_{it} = \Pr[T_i = t \mid T_i > t, X_{it}] \quad (1)$$

$T$  = The discrete random variable giving the uncensored time event occurrence

According to Holford (1976) and Prentice and Gloeckler (1978), if the data are assumed to be generated by the continuous time proportional hazard model such that  $\log h(t, X) = \gamma(t) + \beta' X$  from the general form  $h(t, X) = h_0(t)\ell^{\beta' X}$ , then the corresponding discrete time hazard function is given by:

$$h_{it} = 1 - \exp[-\exp(\gamma_t + \beta' X_{it})] \quad (2)$$

Equation (2) can be solved to yield a complementary log-log function of the form

$$\log[-\log(1 - h_{it})] = \gamma_t + \beta' X_{it} \quad (3)$$

$\gamma_t$  is the baseline hazard which summarizes the pattern of duration dependence in the discrete time hazard.

Maximum likelihood estimation of the model is possible in discrete time without any restrictions on  $\gamma_t$ . According to Jenkins (2005), the likelihood contribution for a censored exporting spell is given by the discrete time survivor function

$$S_i(t) = \Pr(T_i > t) = \prod_{j=1}^t (1 - h_{ij}) \quad (4)$$

Further, the likelihood contribution for a complete spell is given by the discrete time density function

$$f_i(t) = \Pr(T_i = t) = h_{it} S_i(t-1) = \frac{h_{it}}{1 - h_{it}} \prod_{j=1}^t (1 - h_{ij}) \quad (5)$$

Thus, the likelihood function for the entire sample may be written as

$$\begin{aligned} L &= \prod_{i=1}^n [\Pr(T_i = t_i)]^{c_i} [\Pr(T_i > t_i)]^{1-c_i} \\ &= \prod_{i=1}^n \left[ \left( \frac{h_{it}}{1 - h_{it}} \right) \prod_{j=1}^t (1 - h_{ij}) \right]^{c_i} \left[ \prod_{j=1}^t (1 - h_{ij}) \right]^{1-c_i} \\ &= \prod_{i=1}^n \left[ \left( \frac{h_{it}}{1 - h_{it}} \right)^{c_i} \prod_{j=1}^t (1 - h_{ij}) \right] \end{aligned} \quad (6)$$

Taking logarithm of equation (6) gives

$$\log L = \sum_{i=1}^n c_i \log \left[ \frac{h_{it}}{1 - h_{it}} \right] + \sum_{i=1}^n \sum_{j=1}^t \log(1 - h_{ij}) \quad (7)$$

According to Allison (1982), we can substitute the discrete time hazard function into equation (7) and then maximize  $\log L$  with respect to  $\gamma_t (t = 1, 2, \dots)$  and  $\beta$ . He argues that a further manipulation of equation (7) such that we define a dummy variable  $y_{it}$  (equal to one if firm  $i$  experiences exit at time  $t$  and zero if otherwise) will yield

$$\log L = \sum_{i=1}^n \sum_{j=1}^t y_{it} \log \left[ \frac{h_{ij}}{1 - h_{ij}} \right] + \sum_{i=1}^n \sum_{j=1}^t \log(1 - h_{ij})$$

$$= \sum_{i=1}^n \sum_{j=1}^t [y_{it} \log h_{ij} + (1 - y_{it}) \log(1 - h_{ij})] \quad (8)$$

Equation (8) is just the standard likelihood function for a binary regression model in which  $y_{it}$  is the dependent variable.

In this model, duration dependence will be measured non-parametrically. Thus, duration-interval-specific dummy variables are created for each spell year at risk. For this study, there are eight (8) duration intervals and hence eight duration dummy variables are created. For duration intervals in which there are no events (failures), they are incorporated into other duration interval dummy variables with small number of events to make estimation possible.

According to Esteve-Perez, Manez-Castillejo, et al. (2007), incorporating unobserved heterogeneity into equation (2) will give

$$h_{it} = 1 - \exp[-\exp(\gamma_t + \beta' X_{it} + u_i)] \quad (2i)$$

Where  $u_i = \ln v_i$  and  $v_i$  enters the proportional hazard model multiplicatively such that  $h(t, X) = h_0(t) \ell^{\beta' X} v_i$ .  $v$  is assumed to follow a gamma distribution with a unit mean and variance  $\sigma^2$  which will be estimated from the data.  $u_i$  summarizes the impact of possible omitted variables on the hazard rate, whether intrinsically unobservable or unobserved from the data at hand.

Failure to capture unobserved heterogeneity may lead to the under-estimation of the true proportional response of the hazard to a change in the regressors; and over-

estimation (under-estimation) of the degree of negative (positive) duration dependence in the hazard (Esteve-Perez, Manez-Castillejo, Rochina-Barrachina, & Sanchis-Llopis, 2007).

### **3.2 Explanatory Variables**

Time is measured non-parametrically. Thus, duration dummy variables are featured in the model to capture the effect of time. Given that there is a maximum of eight years discrete time duration interval, the dummy variables are eight. However, some years are merged into others because they had no events occurring in them. Years 3, 4, 5, 6, 7, and 8 are merged while years 1 and 2 stand on their own. In total there are 3 dummy variables to capture the effect of time.

Variable including firm age, size, productivity, export intensity, and foreign capital participation are classified as firm characteristics while capital intensity and type of product being exported form industry characteristics.

Age is measured as the number of years since the firm was established. Firm age is featured into the model as a dummy variable which takes the value one (1) if the firm is at least ten years old and takes the value zero (0) if the firm is less than ten years old. Firm size is measured by the number of workers the firm employs. A dummy variable is created that takes the value of one if the number of employees is greater than or equal to hundred (100) and a value of zero if otherwise. Firms that employ at least 100 employees are considered large while those that employ less than 100 people are considered small. For issues related to data availability, firm productivity is measured as output per unit of labour (gross output labour productivity). Foreign capital participation is captured in the model as a dummy variable that takes the value one (1) if a firm has any foreign investors in its ownership structure and zero (0) if not. Export intensity refers to the percentage of a firm's

total output that is exported and is measured as a dummy variable that takes the value one (1) if the firm exports at least 50% of its total output and zero (0) if otherwise.

For industry characteristics, capital intensity is measured as fixed asset (value of capital stock) per employee. To minimize the problems associated with this measure<sup>10</sup>, the value of capital stock at constant prices is used rather than value of capital stock at current prices. To capture the effect of the type of product (i.e. whether final consumer good or an intermediate good) being exported, a dummy variable is created that is equal to 1 if the firms exports a final good and is equal to 0 if otherwise. Final goods here are represented by furniture, food (food and drink), and garment<sup>11</sup>.

Finally, to measure the effect of geographical proximity on export survival, a dummy variable is created that is equal to one if firms export at least 50% of their total exports to other African countries and is equal to zero if otherwise. This is as far as the available data can take us.

Thus, based on the discussions above,  $\beta' X_{it}$  in equations (2) and (3) is specified as:

$$\beta' X_{it} = \beta_1 age1 + \beta_2 size1 + \beta_3 prod + \beta_4 xint ens + \beta_5 for2 + \beta_6 cap int ens + \beta_7 final + \beta_8 exafr$$

Where *age1* = dummy variable for age of firm; *size1* = dummy variable for size of the firm; *prod* = The firm's productivity level; *xint ens* = dummy variable representing export intensity; *for2* = dummy variable representing foreign capital participation; *final* = dummy variable specifying the type of product being exported; and *exafr* = dummy variable for proximity of export destination.

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<sup>10</sup> Price changes affect the value of capital. See (Baah-Nuakoh, 2003)

<sup>11</sup> The subsectors captured include woods, furniture, metal, food processing, textiles and garments (as captured in the surveys)

## **4. Data and Descriptive Statistics**

### **4.1 Data**

The dataset used in this study was developed using the regional program for enterprise development/Ghana Manufacturing Enterprise surveys. The surveys were conducted by the joint collaboration of the Centre for the Study of African Economies (CSAE), the University of Oxford, the University of Ghana, Legon and the Ghana Statistical Office. The Ghana Manufacturing Enterprise survey is a continuation of the regional program for enterprise development survey which ended in 1995. In each year, approximately 200 firms were surveyed. Among the major areas of the manufacturing sector covered include wood and furniture, metalworking, food processing, and textiles and garments. *The dataset accessible to us for this study runs from 1991 to 1998.* There were 18 exporting firms in the first year of the survey out of the 200 firms sampled. By 1998, the number of firms in the sample that were exporting had increased to 44; this includes those who entered into exporting over the survey period.

The unit of observation for this study is the continual number of years a Ghanaian manufacturing firm exports. The advantage of using these two surveys combined as the source of data is that firms and their characteristics are consistently observed over the eight-year period, thus giving us the basis to observe both the exporting behaviour of the firms over the survey period and the factors that influence this behaviour. Observing the data gives the indication that some firms stopped participating in the survey along the way. Hence, there is no information about them from the time they stopped till when the survey ended. In this study those firms are excluded.



## 4.2 Descriptive Statistics

From the data, 83 firms that had enjoyed at least one export stint in their operation. Of these, 43 started as small firms while 39 started as large firms. The wood and furniture subsector had the largest numbers of both the small and large firm categories; with 21 large firms and 16 small firms (Table 1). The bakery subsector had no large firm operating in it while it had only 1 small firm operating, thus making it the subsector with the lowest number of exporting firms.

Generally, there were 10 large firms that started young and 25 that started old. Within the small-firm category, 15 firms originally started young while 27 started old. There were 32 firms with some foreign capital investment and 47 entirely domestically-owned. Of the firms with foreign capital participation, 25 had at least 50% foreign stake while only 7 had foreign stake less than 50% (Table 1).

For the model estimation, there were 183 observations corresponding to 57 firms. There were 21 complete spells, implying that there were a total of 21 failures. There were no events in duration-intervals 3, 5, 7 and 8 while duration-interval 1 recorded the highest number of deaths (9) followed by duration-interval 2 with 7.

Approximately 56% of the exporters were still alive (or 44% were dead) after 5 years while 47% remained alive after 6 years<sup>12</sup> (Appendix 1). This implies that the median duration is 5-6 years. This is quite high relative to the median duration for some other developing countries as reported in some empirical works.

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<sup>12</sup> Or the probability of surviving after five years is 0.56 while the probability of surviving after 6 years is 0.47

Table 1 Firm characteristics: by size

<i>Characteristics</i>	<i>Large (Number of Employees ≥100)</i>	<i>Small (Number of Employees &lt;100)</i>	<i>All</i>
<b><u>Sector</u></b>			
Garments and textiles	4	8	12
Wood and furniture	21	16	37
Metal, chemicals and machines	7	14	21
Food, Drink and Bakery	7	5	12
<b>Total</b>	<b>39</b>	<b>43</b>	<b>82</b>
<b><u>Age</u></b>			
Young (<10years)	10	15	25
Old (≥10 years)	25	27	52
<b>Total</b>	<b>35</b>	<b>42</b>	<b>77</b>
<b><u>Foreign Capital Participation</u></b>			
≥50%	18	7	25
<50% & >0%	2	5	7
=0%	18	29	47
<b>Total</b>	<b>38</b>	<b>41</b>	<b>79</b>

Source: Author's elaboration based on RPED/GMES surveys

## 5. Presentation and Discussion of Results and Robustness Check

### 5.1 Presentation and Discussion of Results

As in Table 2, three complementary log-log models were estimated. The first model captures the effect of time only; without any other covariate. The second model is estimated with both time and other necessary covariates but under the assumption of no unobserved heterogeneity. The third model is estimated just as the second but under the assumption of the existence of a gamma distributed individual heterogeneity term. All the three models treat the baseline hazard non-parametrically.

Given that there are no events in periods 3, 5, 7, and 8, only three dummy variables are used for the treatment of time: d1 for duration-interval 1, d2 for duration-interval 2, and d345678 for duration-intervals 3, 4, 5, 6, 7, and 8 combined.

In model 3, a test of significance of the unobserved heterogeneity shows that the null hypothesis<sup>13</sup> cannot be rejected. The  $\text{chibar2}(01)$ <sup>14</sup> statistic was used and the result generated is  $\text{chibar2}(01) = -7.8e-07$  with a p-value of 0.5<sup>15</sup> (Table 2). This means there is no unobserved heterogeneity for the firms. Thus, the first two models in Table 2 are used in the discussion of the results from the estimation of the discrete time proportional hazard model.

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<sup>13</sup> The unobserved heterogeneity component variance ( $\sigma^2$ ) is equal to zero

<sup>14</sup> The preference of the frailty model over the non-frailty model or otherwise depends on the likelihood ratio test, which is “a ‘boundary’ test that takes account of the fact that the null distribution is not the usual chi-squared (d.f. = 1) but is rather a 50:50 mixture of a chi-squared (d.f. = 0) variate (which is a point mass at zero) and chi-squared (d.f. = 1) – hence the reference to ‘chibar2 (01)’ in the output” (Jenkins, Survival Analysis, 2005). See (Gutierrez, Carter, & Drukker, 2001) for more details

<sup>15</sup> Not significant even at 10%

**Table 2 Results of models estimation**

<i>Variables</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3 (with frailty)</i>
<u>Duration Dependence</u>			
<b>d1</b>	-1.761 (0.000)*	-0.6185 (0.482)	-0.6185 (0.537)
<b>d2</b>	-1.562 (0.000)*	0.9146 (0.365)	0.9146 (0.373)
<b>d345678</b>	-2.850 (0.000)*	-0.3623 (0.691)	-0.3623 (0.715)
<u>Firm Characteristics</u>			
<b>prod</b>		-0.000 (0.545)	-0.000 (0.498)
<b>xintens</b>		-2.588 (0.001)*	-2.588 (0.001)*
<b>for2</b>		0.223 (0.775)	0.223 (0.815)
<b>size1</b>		-2.222 (0.005)*	-2.222 (0.007)*
<b>age1</b>		-1.866 (0.012)**	-1.866 (0.001)**
<u>Industry Characteristics</u>			
<b>final</b>		1.973 (0.007)*	1.973 (0.031)**
<b>capintens</b>		-0.000 (0.314)	-0.000 (0.328)
<u>Export Market Characteristics</u>			
<b>exafr</b>		0.4906 (0.454)	0.4905 (0.505)
Frailty/Unobserved Heterogeneity			
<b>Coefficient of Gamma variance = -7.8e-07 LR test of Gamma var. = 0 Prob.&gt;=chibar2 = 0.5</b>			
<b>Log likelihood</b>	-62.060759	-32.82110803	-32.821108
<b>Number of observations</b>	<b>183</b>	<b>155</b>	<b>155</b>
<b>Source: Author's elaboration based on RPED/GMES surveys</b>			
<b>Note: *- significant at 1% and **- significant at 5%</b>			

Given that larger (less negative) values are associated with higher hazards, the estimated model (model 1 of Table 2) exhibits negative duration dependence. That is, the hazard generally falls over time. To check the significance of the changes in hazards over

time, a test of equality was carried out. The results of the test show that the difference between the hazards for d1 and d2 is statistically insignificant (see Appendix 2). However, there are statistically significant differences between hazards of d1 and d345678 as well as d2 and d345678 (see Appendix 2). The existence of negative duration dependence in the estimated model implies that the export survival of Ghanaian manufacturing exporters is enhanced the longer they remain exporting. This confirms theoretical predictions as derived from both the passive and active learning models (and justified by Dixit (1986a)). According to Dixit (1986a), entry into export markets involves high sunk cost and thus the decision to enter depends on the expected future returns from exporting. This involves a consideration of the cost of re-entry after an initial exit as well as the effects of the updating costs that will be lost shortly after a firm exits exporting. Thus firms tend to persist in exporting once they begin to export in order to avoid these losses.

The nature of the duration dependence in the estimated model reveals some important details with regards to the learning process of exporting firms. First, the fact that the hazard is statistically the same for the first two duration-interval periods implies that the initial entry cost that exporting firms incur allows them to export for two years without incurring further updating costs. This means that for the first two years, updating cost is small and thus learning-by-exporting is slow (Esteve-Perez, Manez-Castillejo, Rochina-Barrachina, & Sanchis-Llopis, 2007). However from the third year, the hazard rate drops significantly which implies updating costs feature more into firms' export operations after the second year. This significantly increases potential cost of re-entry, accelerates learning-by-exporting, and delays exit from exporting (Esteve-Perez, Manez-Castillejo, Rochina-Barrachina, & Sanchis-Llopis, 2007).

**Table 3 Variables that are significant with their coefficients in exponents**

<i>Variable</i>	<i>Exp (<math>\beta</math>)</i>
age1	<b>0.155 (0.012)*</b>
size1	<b>0.108 (0.005)*</b>
xintens	<b>0.075 (0.001)*</b>
final	<b>7.195 (0.007)*</b>

**Source: Author's elaboration based on RPED/GMES surveys**

**Note: \*- Significant at 1%**

In terms of firm characteristics, model 2 (of Table 2) reveals that older firms have lower hazard rate than younger ones. Older exporting firms have 15.5% lower hazards than younger exporting firms (Table 3). This result is consistent with the active learning theory and empirical findings by (Esteve-Perez, Manez-Castillejo, Rochina-Barrachina, & Sanchis-Llopis, 2007) and (Volpe-Martincus & Carballo, 2008) among others. Older firms have more experience in operation, more established networks, and better knowledge of the business terrain. This gives them the ability to survive the challenges that confront them in the course of doing business relative to younger firms. Even when they enter foreign markets, they derive benefits from these advantages.

It is also revealed that the hazard rate of larger firms is 10.8% lower than that of smaller firms (Table 3). This result is consistent with theoretical prediction and empirical findings by Esteve-Perez, Manez-Castillejo, Rochina-Barrachina, & Sanchis-Llopis (2007) and Volpe-Martincus & Carballo (2008) among others. Larger firms are better placed to survive because they tend to have better conditions for operations manifested in terms of access to quality inputs, favourable tax conditions, and easier access to information as well as economies of scale (and production at minimum efficient scale). These combine to

enhance their profitability in exporting and thus make them more capable of surviving longer exporting spells than smaller exporters.

The results further suggest that firms with higher export intensity have their export survival prospects extended by 7.5% as compared to those with lower export intensity. High export intensity leads to higher and quicker accumulation of knowledge about exporting and foreign demand and taste (Castellini, 2002). This acquired knowledge improves firms' efficiency, thus leading to enhanced export survival prospects.

The coefficient for the variable that represents productivity (*prod*) is not statistically significant. This implies that the self-selection hypothesis that suggests that only efficient firms are self-selected into exporting does not hold in this case. It also implies that though most exporters are highly productive compared to non-exporters<sup>16</sup>, high productivity is not necessarily a pre-condition for survival in export markets but rather a by-product of exporting. This conclusion follows the conclusion from the work of Biesebroeck (2004) which suggests that exporters in sub-Saharan Africa are more productive than non-exporters in the same industry and that these exporters improve their performance levels **after** they enter foreign markets. The work further suggests that African exporters do not just have high post-entry productivity levels but also high post-entry productivity growth. Thus for African manufacturing exporters- including Ghanaian firms- productivity gain is a by-product of exporting and does not necessarily serve as a condition for exit or survival.

The result further suggests that foreign capital participation is not a significant determinant of export survival (see model 2 in Table 2). A possible explanation for this is that none of the two hypotheses (exporting platform and market-seeking) proposed by

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<sup>16</sup> As suggested by some studies such as (Biesebroeck, 2004)

Dunning (1981, 1977) dominates the other as the basis for foreign direct investment into Ghanaian manufacturing firms that export. While some of the foreign investors invest to exploit Ghana's comparative advantages in exporting<sup>17</sup>, others invest merely as a means to penetrate the Ghanaian market<sup>18</sup>.

In terms of the industry characteristics, the results suggest that firms that export final product have higher hazards than firms that export other products. From Table 3, final products exporters have a hazard rate that is 7.2 times higher than non-final product exporters. Rauch (1999) suggests that export of final consumer goods is associated with higher initial sunk costs because it requires adjustment of product features to suit local demand and the establishment of distribution networks that meet the needs of the specific product. Thus cost of re-entry is high for such exporters. This prolongs the survival of the exporters of final products relative to exporters of other products. However as the results from this study suggests, final products exporters are more likely to exit than other products exporters. This perhaps reiterates the fact that exporting manufacturing final consumer goods from Ghana comes with its unique challenges. In the first instance, most countries, especially developed, have set certain quality standards<sup>19</sup> for the acceptance of final consumer goods from other countries. Thus, exporters of final consumer goods incur extra costs in trying to upgrade their products to those standards. These costs are quite separate from the normal periodic updating costs that exporters incur to adapt their products to the changing demand conditions in foreign markets among other things. In effect, exporters of final consumer goods incur higher per unit costs than those who export intermediate goods. This gives lower price-cost margins and makes it more likely that

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<sup>17</sup> Consistent with export platform hypothesis

<sup>18</sup> Consistent with market-seeking hypothesis

<sup>19</sup> Which may be less demanding than the quality standards set for intermediate goods because the target consumers are not individuals but other firms



those who enter foreign markets with final consumer goods will find it less profitable to continue exporting after some time. In addition, the final consumer goods sub-sector is one area that has a lot of competition. Even domestically, some manufacturing products have been out-competed by similar products from the outside world especially the Asian countries because they come cheaper<sup>20</sup>. This makes it even more likely that exporters of final consumer goods will be out-competed in foreign markets. With all these realities, it makes sense for exporters of intermediate manufacturing goods to have higher export survival rates than exporters of final consumer manufacturing goods.

Capital intensity has no effect on the export survival of Ghanaian exporters of manufactures. Thus with regards to export survival of firms, it does not matter whether the exporting firm operates in a highly capital intensive industry or in a less capital intensive industry. This is possibly the case because most of the products classified as manufactured exports from Ghana are not high technology products but products that require very minimal levels of capital acquisition to produce. For instance, the products that are very prominent in the manufactured exports category are wood, furniture, cocoa pastes, garments etc. Thus, the differences in the technology requirements for the various categories of manufacturing exports are not that significant to make a difference in export survival prospects.

Finally, the result from Table 2 shows that geographic proximity is not a significant determinant of export survival. This implies that export survival does not depend on whether a Ghanaian manufacturing exporter exports to another African country or to the rest of the world. Though Ghana is closer (geographically and socially) to other African countries than to other geographical territories such as the EU and the US, Ghanaian

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<sup>20</sup> Examples include the clothing and textile products

exporters have not been able to take advantage of this geographic proximity. This is because exporting within Africa comes with its own challenges partly due to technological underdevelopment in the continent. For instance, in those periods (1991-97) communicating<sup>21</sup> with other African countries was more expensive and slow relative to communicating with Europe or America. In addition, there were, and still are, serious trade barriers even with countries within the ECOWAS sub-regions, in spite some trade arrangements that may have been in existence. An example is continued existence of territorial borders and the extortions that take place at those borders. On the other hand, trade with other regions, especially the US and EU, is enhanced by well functioning trade agreements<sup>22</sup> and easiness due to technological advancements. In effect, the benefits associated with the fact that Ghanaian exporters to other African countries do not have to incur high entry and updating costs (due to relative social similarities and geographic proximity) are offset by the combine effect of the benefits associated with better trade arrangements with the EU, US, and other countries and the challenges of trading with other African countries.

## **5.2 Robustness Check**

In checking for the robustness of the results obtained from the estimation of the proportional discrete time hazard model, I use an alternative assumption of the model specification. Specifically, I specify a logistic model instead of the initial complementary log-log model. Remember, the survival data may be intrinsically continuous but is observed only in intervals. For small hazard rates both the complementary log-log and logit specifications yield similar results (Jenkins, 2005). Thus, the purpose is to assess the

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<sup>21</sup> Internet and telephone

<sup>22</sup> Such as AGOA

sensitivity of the estimates to the change in assumption about the behaviour of the continuous hazards within intervals.

The estimation result of the logistic model yields statistical significance for the same variables- export intensity, size, age, and final product export dummies- as that of the complementary log-log model. Likewise, the estimates of the coefficient are very similar in the two cases as presented in Table 2 and Table 4. This suggests that the estimates are quite robust to different assumption about the behaviour of the continuous hazards within intervals.

**Table 4 Estimated results using a logistic model**

<i>Variables</i>	<i>Coefficients</i>
<b>d1</b>	-0.245 (0.831)
<b>d2</b>	1.631 (0.224)
<b>d345678</b>	0.125 (0.918)
<b>Prod</b>	-0.000 (0.591)
<b>xintens</b>	-3.019 (0.002)*
<b>for2</b>	0.196 (0.828)
<b>size1</b>	-2.514 (0.006)*
<b>age1</b>	-2.131 (0.023)**
<b>final</b>	2.138 (0.011)**
<b>capintens</b>	0.000 (0.282)
<b>Exafr</b>	0.476 (0.562)
<b>Log likelihood</b>	-33.457415
<b>Number of observations</b>	<b>155</b>

**Source: Author's elaboration based on RPED/GMES surveys**

**Notes: \* and \*\* represent 1% and 5% significant levels respectively**

## **6. Conclusion and Recommendations**

### **6.1 Conclusion**

The paper has used an eight-year panel data to examine the impact of firm, industry, and export destination characteristics on export survival Ghana's manufacturing exporters. In doing so, the survival analysis technique was use.

The findings suggest the existence of negative duration dependence. The nature of the duration dependence reveals that the initial cost of entry that firms incur when they start exporting allows them to export for the first two years without incurring any updating costs, after which updating costs become prominent in the operations of these firms. The study further reveals that older firms survive longer in exporting than younger ones. Similarly, larger firms have lower hazards than smaller firms. Firms with higher export intensity are also shown to persist more in exporting than firms with lower export intensity. Firms that export final consumer products experienced higher hazards than firms that exported other products. The results show that firm productivity, capital intensity, and foreign capital participation do not significantly influence export survival, likewise the proximity of the destination market.

### **6.2 Recommendations**

The existence and nature of the negative duration dependence suggest the presence of learning-by-exporting effect for Ghanaian manufacturers. This implies that exporting could yield efficiency gains for Ghanaian manufacturers. The gains may be in terms of growth in profitability, improved risk diversification, knowledge flow from their international buyers (and incurring update costs), etc. Exporting will make Ghanaian

manufacturers better manufacturers and this will cause further growth of manufacturing exports and general improvement in the manufacturing sector's contribution to national output. Additionally, as Bigsten, et al. (2002) admits, domestic markets in Africa are too small for manufactures and thus if countries such as Ghana are to industrialize it has to be through exporting. These make a good case for a policy that selectively promotes manufacturing exports (within the boundaries of international trade laws).

Any such policy should specifically focus on firms that have greater probability of success in foreign markets rather than just reducing entry costs generally (lest it becomes a waste of resources). In this regard, older and larger manufacturers should be targeted with incentives to make them interested in exporting. Further, special incentives should be introduced to encourage firms that are willing to export more than 50% of their total outputs. In doing so, the Ghana Free Zone campaign which started in 1996 should be intensified. Manufacturers that produce intermediate goods should be given special attention over those that produce final consumer goods because they are more likely to persist exporting.

In addition to the above, smaller exporters that manufacture similar products should be encouraged to form cooperatives, such that they operate in groups but their individual independence are still maintained. In this case they pool their resources together, produce as a unit and then export either as a unit or individually. This will guarantee them benefits that larger firms enjoy, relating to economies of scale, producing at minimum cost levels, meeting international quality standards and access to financing among others. They thus will be able to export on a larger scale and/or at lower per unit costs and achieve longer exporting stints. Over time, they would grow and achieve greater efficiency levels individually.

Finally, it has been shown that firms-after the first two years of exporting-incur updating cost in order to remain exporting. Thus, the policy for manufactures exports promotion should focus on improving export infrastructure and accessibility of export information in order to reduce the updating costs firms incur and at the same time guaranteeing firms the benefits that updating costs bring.

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## Appendix 1

Table of Survivor Function Estimates

	Intervals	Beg. Total	Deaths	Lost	Survival	Std. Error	95% Conf. Interval	
<b>1</b>	2	57	9	11	0.8252	0.0529	0.6911	0.905
<b>2</b>	3	37	7	3	0.6625	0.0696	0.5072	0.779
<b>3</b>	4	27	0	1	0.6625	0.0696	0.5072	0.779
<b>4</b>	5	26	4	0	0.5606	0.0753	0.4018	0.692
<b>5</b>	6	22	0	15	0.5606	0.0753	0.4018	0.692
<b>6</b>	7	7	1	1	0.4743	0.1017	0.2697	0.654
<b>7</b>	8	5	0	3	0.4743	0.1017	0.2697	0.654
<b>8</b>	9	2	0	2	0.4743	0.1017	0.2697	0.654

## Appendix 2

### Testing the equality of the hazard estimates of the duration Intervals

#### test d1=d2

[exited] d1- [exited] d2 = 0

Chi2 ( 1) = 0.16

Prob > chi 2 = 0.6932

Decision: fail to reject the null hypothesis (i.e. [exited]d1-[exited]d2 = 0)

#### test d1=d345678

[exited] d1 – [exited] d345678 = 0

Chi2 ( 1) = 3.81

Prob > chi2 = 0.0509

Decision: reject the null hypothesis (i.e. [exited]d1– [exited] d345678 = 0)

#### test d2=d345678

$$[exited] d2 - [exited] d345678 = 0$$

$$\text{Chi2} ( 1) = 4.83$$

$$\text{Prob} > \text{chi2} = 0.0279$$

Decision: reject the null hypothesis (i.e. [exited]d2– [exited] d345678 = 0)