The Growth Dynamics of New Export Entrants in Kenya: a Survival Analysis

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Abstract

This paper uses firm-level transaction dataset from Kenya to examine the entry and growth dynamics of new exporters in international markets and the factors associated with survival in foreign markets. The findings show that for the new exporters, once their trade relationship manages to survive the initial year of entry, it grows and expands overtime contributing substantially to the nation's exports. However, survival beyond the first year is only for a few. Firm export behaviour such as a large initial trade value of a transaction, exporting differentiated products, exporting a larger number of products and serving a large number of destination countries plays a significant role in the survival of exporters in international markets.

Keywords: Survival of new exporters, Export duration, Kenya

JEL Classification: F10, F14, D22

1 Introduction

Exporters in Sub-Saharan African (SSA) countries face far greater constraints in exporting relative to their peers in the developing and developed economies. Cadot et al. (2013) documents export survival patterns for exporters from four SSA countries and finds frequent entry and exit of exporters from foreign markets. In addition, exporter relations had extremely low chances of survival beyond the first year of entry. This may be potentially wasteful if sunk costs of entry does matter in export entry decision. The cause of short lived trade relations calls for more country specific case studies to determine the patterns of trade duration and the probability of survival as an input to the development of export growth strategy.

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The main objective of this paper is to examine the factors that enhance the probability of survival of Kenya's new exporter's trade relations[1]. We trace the length of time until a firm (exporter) ceases to export any product outside the Kenyan border. This paper presents a more comprehensive picture of trade duration for Kenya's new exporters, along with their determinants. We ask two specific questions. How does the growth in exports of new exporters evolve after entry into international markets? And what factors are associated with the probability of survival for the new entrants to international markets?

Information on how long or how short the duration of a trade relationship is for an average exporter may be important for the potential exporters deciding, ex-ante on the market they need to target for their debut in international markets but it is also essential from a policy point of view (Amador & Opromolla, 2013; Amiti & Freund, 2010; Alvarez & Lopez, 2008). Policy makers from almost all countries and Kenya in particular aim to encourage exports and entry of new exporters, because exports are a major driver of economic growth and jobs (Adam, Collier & Njuguna, 2010; GoK, 2007). This is usually accompanied by fiscal incentives geared toward promotion of exports and raising the number of new exporters as a performance metric. However, knowledge on how many of these new exporters will be able to survive in international markets remains extremely scarce for countries in the Sub-Saharan Africa, and certainly for Kenya. This is surprising given that the length of survival can be considered one of the most comprehensive measures of exporter performance. This paper seeks to add to the growing literature examining this issue for SSA countries, but whose cross-country examination is hampered by lack of access to transaction datasets.

An export relation is defined as a *firm-year* combination and its survival rate after being contracted is analysed for the case of new exporters. This is made possible by access to a unique panel of transaction data for Kenya's firm level exports. We use this data to analyse the patterns and survival of Kenya's new exporters. We make several contributions to the existing literature on exporter survival. Firstly, we document the export duration patterns for firm level trade, for a country whose export portfolio is more diverse within Africa. Secondly, we analyse the determinants of these patterns using panel data that enables us to identify the effect, largely with the time dimension.

The rest of this paper is organized as follows: section two reviews the literature on the pattern and duration of trade relations and their determinants, section three discusses estimation strategy and describes the data, while section four presents the results. Section five concludes.

2 Related Literature

Over the last two decades international trade theory has sought to explain firm internationalisation strategies by focusing the analysis of trade activity at the

[1] Exporters mean all observed traders in the customs database. We have no way to identify if an exporter is an actual producer or not.

firm and product level[2]. This research has progressed in two related areas, namely: the role of firm heterogeneity in productivity and trade costs (Chaney, 2008; Greenaway & Kneller, 2007; Melitz, 2003; Bernard, Redding & Schott, 2003) and the role uncertainty and information asymmetry in breaking into foreign markets (Araujo & Ornelas, 2007; Rauch & Watson, 2003). The two areas are reconcilable by virtue of the presence of sunk costs to exporting, which dictates that only a few firms are able to overcome them and survive in international trade (Clerides, Lach & Tybout, 1998; Roberts & Tybout, 1997). In the following section, we review what the literature tells us about entry, survival and exit from international markets.

In the Melitz (2003) model, firm productivity, induces self-selection into exporting based on ability to overcome the fixed costs of entry into a market. This model suggests that only the most productive firms will export, while lower productive firms will not. Firms at the margins of zero profit productivity thresholds will have a lower chance of surviving in export markets and exit upon falling below that threshold. To explain the fact that fixed costs differs across destinations, Chaney (2008) extends the Melitz model and shows that the minimum productivity needed to export to a destination increases in trade costs, firm's own production costs and decreases in the market size and price level in the destination market. One of the key predictions from Chaney's model is that, as a firm enters more markets her export growth will come mostly from adding to sales in existing markets and not from sales in new markets. Thus, entering and exiting firms will be more marginal in terms of their productivity and will likely contribute less to growth in year to year aggregate exports relative to continuing exporters. This fact underscores the need for export promotion agencies to focus on graduating exporters from mere entry to survival and growth in international markets.

This paper is also related to the literature guided by the theoretical framework featuring trade models with uncertainty and information asymmetry. In Rauch and Watson (2003) and Araujo and Ornelas (2007), the behaviour of exporters is summarized in a sequential equilibrium. Firstly, exporters from a home country form a partnership with distributors in a foreign country that has weak institutions and imperfect contract enforcement. Exporters do not know the type of distributors they are dealing with, some of whom care little about the future (impatient and opportunist). In the second stage, exporters choose an initial volume of goods to be shipped to a distributor. The presence of search costs and information asymmetry cause heterogeneous firms to start small in order to test the credibility of their foreign trade partners. A common stylized fact in literature is that new exporters tend to start small in terms of both values and the number of products exported. Upon survival of the trade relationship beyond the birth year, exports are ramped up, increasing substantially over time.

Empirically, we start off with the pioneering work of Besedes and Prusa,

[2] Greenaway and Kneller (2007) have provided a synthesis and evaluation of this new trade literature in a more systematic way

(2006a, 2006b) in which they investigated the duration of trade relations and their determinants at the product level for the US. The trade relation is defined as the length of "product-country relationship" and they examine the time until a country ceases to export a product to the US, an event referred to as failure. They apply the Kaplan-Meier survival functions to estimate the duration of the US imports from all countries. The estimated hazard rates show that approximately 33 per cent of export relations die within the first year and by the fifth year, up to 63 per cent of the relationships had ended. They find that trade relations remain extremely short lived with a median length of trade to the US being one year.

A great contribution of the Besedes and Prusa (2006a and 2006b) work is bringing to attention the fact that trade relations were extremely short lived using product-country export patterns and their dynamics and advancing possible explanations for the low survival of homogeneous relative to differentiated products. Their findings have been replicated in many other countries (Lejour, 2015; Hess & Persson, 2011; Nitsch, 2009; Brenton, Saborowski & von Uexkull, 2009; Martincus & Carballo, 2009; Eaton et al., 2007),the trade relationship is defined as importer-exporter -product combination. They provide an empirical description of the duration of trade and examine their determinants using discrete-time duration regressions, which allows for controlling of unobserved heterogeneity. Their results show the prevalence of short trade durations in line with results found in the US and Germany

Lejour (2015) studied the duration of Netherlands' export relations. The trade relationship is defined as firm-country-product and the study sought to identify factors that determine the success of such a trade relation. His findings show that a higher initial trade value, a large market size and a shorter distance increased the probability of survival. In addition, membership to the EU reduced the hazard rate by as much as 40% compared to relationships that were with non-EU countries. Furthermore, trade relations with new products had reduced chances of survival by 20 -30% relative to new trade relations with familiar products and destinations. They conclude that new export relations with new exporting firms survived significantly longer than those with new export products. This point underscores the need to consider the firm in the analysis of the duration of a trade relation. Product churning appears to be more prevalent and to some extent reinforces the ability to survive in international markets (Iacovone & Javorcik, 2010; Martincus & Carballo, 2009; Gorg, Kneller & Murakozy, 2008; Alvarez & Lopez, 2008).

In the context of sub-Saharan Africa, Cadot et al., (2013) undertakes the survival analysis of export relationships for four African countries, namely Malawi, Mali, Senegal and Tanzania. Using a detailed transaction level dataset, they explore the determinants of success upon entry into export markets. The success of a trade relationship is defined as survival beyond the first year of a firm-product-destination combination. They estimated the probability of surviving beyond the first year of entry in international trade using OLS, probit and Cox PH model. They included measures of firm's scale and scope and proxies for agglomeration and market attractiveness as regressors. Their findings show that the large the number of other firms selling the same products in the same destination and the greater the firm's geographic scope, raised the probability to survive beyond the first year. The networks effect reflected positive signalling on the profitability of the sector. This in turn enabled firms to overcome external financing constraints and access to information on regulatory changes and strategies to overcome barriers resulting into sustained trade relationships. In addition, doubling (100%) of the initial value of a firm's average export raised the probability of success by 2%.

To summarize, a number of factors that determine the probability of survival of a trade relationship emerge from the reviewed literature. The larger the initial value of a transaction, and dealing in products that are differentiation are associated with a higher chance of survival (Lejour, 2015; Cadot et al., 2013; Martincus & Carballo, 2009; Brenton, Saborowski & von Uexkull, 2009; Nitsch, 2009; Besedeš & Prusa, 2006b; Besedeš & Prusa, 2006a).The number of products shipped and the number of countries served per exporter are used as proxy for firm ability in terms of product and geographic scope (Martincus and Carballo, 2009; Lejour 2015). The number of exporters exporting a given product to a destination is used as a proxy for the network effects and information spillovers (Cadot et al., 2013). Destination characteristics are captured using the usual gravity type variables such as distance; real GDP, common border, common language, common colonial history, bilateral real exchange rates and regional trade arrangements (Lejour, 2015; Obashi, 2010; Nitsch, 2009).

3 Estimation Strategy and data

3.1 Estimation Methods

Analysing the time to the occurrence of an event, where the event is the end of a firm's export relationship is better handled using survival analysis This is because the time to failure of an event is a non-negative real value (Cleves, 2008; Kiefer, 1988; Cox, 1972). Estimation using ordinary least squares (OLS) may lead to prediction of non-positive values. In addition, the OLS assumption of normality of the error term is violated when considering survival data. In practice, there is also left and right censoring [3] in the dataset, requiring use of alternative estimation techniques other than OLS. Survival analysis takes into account the challenges associated with duration data. They account for the evolution of the exit risk and its determinants over time (Martincus and Carballo, 2009). The survivor function $S(t)$ is defined as follows:

$$S_i(t) = P(T \geq t) = 1 - F_t(t) \tag{1}$$

[3] Left censoring-Trade relationships that are observed at the start of the sample period (i.e.2004 in our case) and last until completion of the spell, the actual duration of that relationship is not known because the time from inception of the spell to the start of the study period is unknown (see Kiefer, 1988:647). Right censoring-the end of the study sample period (i.e. 2013) interrupts trade spells that are still in progress.

where $T \geq 0$ denote the duration of export relations and has some distribution in the population of all new exporters in Kenya and t is a particular value of T. The survivor function gives the probability that the duration of trade relations T equals or exceeds the value t (i.e. the compliment of the probability distribution of duration $F(t)$). In keeping with the trend observed in the literature on duration analysis, non-parametric estimates for the probability of exit from export status is provided using the Kaplan-Meier (KM) survival functions estimator. The KM product limit estimator is specified as:

$$S_i(t) - \prod_{t_i \leq t} \frac{n_i d_i}{n_i} \tag{2}$$

where n_i denotes the number of subjects at risk of failure at time t_i and d_i denotes the number of observed failures. The non-parametric estimator gives us a rough guess of the shape of the raw survival probability (or hazard rates), before including any explanatory variables. This is a graph that provides a series of declining horizontal steps that approaches the true survival function for the population in question. The area under the survivor function provides the mean duration of export relations. The differential in the area under the curve reflects differences in performance across product, exporter and country characteristics. We present these non-parametric estimates in the results section for Kenya.

The influence of explanatory variables on the distribution of trade durations depends on the specification used. Previous studies seeking to explain the factors that determine trade durations (Nitsch, 2009; Martincus & Carballo, 2009; Besedeš & Prusa, 2006b; Besedeš & Prusa, 2006a) use the continuous time proportional hazard model specified as:

$$h_i(t, X_i) = h_0(t) Exp(X_i' \beta_x) \tag{3}$$

where: $h_i(t, X_i)$ = The hazard rate (the risk of failure) of a firm's export spell i, and h is the probability that the relationship fails in period $t+1$, having survived to period t. $h_0(t)$ = represents the baseline hazard that depends only on time at risk; $\exp(X_i' \beta_x)$ = is an exponential part that depends on products, firm and destination characteristics; X_i' = the vector of covariates for the product, firm and destination; and β_x = a vector of coefficients to be estimated.

Under this formulation, the effect of the explanatory variables is simply to multiply the hazard function by a scale factor. As such, there is a parallel shift (proportional) of the baseline hazard which is estimated for all exporters whose export relation survives up to a particular period (Kiefer, 1988). Equation (3) is interpreted as the hazard (risk of failure) a firm's export relation (trade spell) faces as being a function of the hazard every other relationship faces (baseline hazard), modified by specific firm characteristics. It is estimated semi-parametrically using the partial –likelihood approach proposed by Cox (1972). This approach has the advantage of avoiding potential mis-specification of the baseline hazard but relies crucially on the assumption that the hazard function is proportional. This assumption can be tested using Schoenfeld residuals (Schoenfeld, 1983). If rejected, adoption of discrete choice models such as panel logit is used in the literature (Lejour, 2015). The logit is specified as:

$$\Pr(y_{it} = 1 | X_{it}, \varepsilon_{it}) = \theta(X'_{it}\beta + \mu_t + \alpha_i + \omega_{it}) \quad (4)$$

Where y_{it} is equal to 1, if a firm's trade relationship ends and zero otherwise. X_{it} is a vector of firm and product characteristics. μ_t is the time fixed effects that controls for yearly shocks common to all firms and α_i is a firm specific fixed effects, while ω_{it} is a random error term. θ is a logistic CDF and we estimate the model using panel logit with both random and fixed effects. The next section discusses measurements of key variables and challenges associated with modelling duration data.

3.2 Description of data and sources

The firm level export data is obtained from the Customs Services Department of the Kenya Revenue Authority (KRA), through the National Treasury, Kenya. This is a new and unique panel data containing the overall flow of exports at the point of exit from 2004 to 2013. Each transaction contains information on the product being exported at the 8 digit HS product classification, the month of shipment, the destination of shipment, the free on board (FOB) value in Kenya shillings[4], and the quantity and units of measurement.

Descriptive statistics of Kenya's export profile

Table 1 reports the average export per exporter, the number of exporters, the number of HS6 products, the number of countries and total exports using the KRA data. To validate the data, it also presents the value of exports (excluding re-exports) published by the Kenya National Bureau of Statistics (KNBS) for the sample period. The value of exports has increased by approximately 103% over the period, rising from US$ 2,691 million in 2005 to US$ 5,475 million in 2013. The number of exporters[5] behind this aggregate flow has also risen by approximately 32% from 3,918 in 2005 to 5,175 in 2012.

The last three columns provide the consistency check of the customs data against the published KNBS[6] data (KNBS, 2013). With the exception of 2005 and 2010, the deviations lie within 2 per cent of the KNBS data. This implies, the customs data is reasonably consistent with the published data but in addition it grants us a more comprehensive detail of trading activity than that available at the aggregate level. It can be observed that Kenya recorded a strong growth in ordinary export revenue for the period between 2004 and 2007. This faltered over the years 2008 and 2009, in response to the global financial crisis before rebounding in 2010 from US$ 4.5 billion to US$ 5.7 billion in 2011 (26.7%). However, this strong recovery was short-lived and export fell to US$ 5.5 billion in 2013 (a decline of 3.6%) from the 2011 value.

[4] This is in line with the data disclosure agreement that information on firm name remains anonymous.

[5] Exporters here refer to all traders shipping through customs. This is not necessarily a production firm. It may only be a trading firm.

[6] KNBS figures are obtained from annual economic survey books, for all the years in the sample.

The sudden stop in the momentum of export growth is attributed to a decline in both volume and prices of exports, but we do not separate the magnitude of each of these effects. Figure 1 shows the ratio of exports as a percentage of GDP over the sample period and captures the fall in exports, especially after 2011.

The ratio of exports to GDP increased from 11.3% in 2004 to a peak of 19.6% in 2007 before falling to 18.5% in 2010. It then rebounded to 22.6% in 2011 before falling back to 19.5% in 2013. In terms of the popular destination for Kenya's exports, the top export destination in 2004 was the UK, while in 2012 it was Uganda. Table 2 shows the transition in ranking of the top 15 destinations between 2004 and 2012.

The top 15 countries account for over 70% of Kenya's total exports for 2004 and 2012. African countries make up approximately 40% of the total. There are observable changes in geographical composition of exports over the two periods. For example, the USA has moved up six places, from twelfth in 2004 to sixth in 2012. Other destinations that have moved up in ranking include Sudan, Somalia, Uganda and Tanzania. Germany has moved down the most places from seventh in 2004 to fourteenth in 2012. Countries such as France and Belgium that were among the top 15 in 2004, have been replaced by the UAE and Rwanda in 2012.

Kenya's exports are dominated by processed food, beverages and tobacco sector followed by the vegetables sector in the two periods. Table 3 shows the shares of each sector in overall export revenue for 2005 and 2012.

The share of processed food, beverages and tobacco exports has increased from 29.9% in 2005 to 35.2% in 2012 while that of vegetables has decreased from 28.1% to 21.6% over the same period. The share of chemicals has increased from 6.7% to 9.4%, over the two years. Textile and clothing have also risen from a share of 1.3% in 2005 to 2.3% in 2012. In addition, we used a broad based definition[7] of sectors to reduce the 21 sectors into eight.

3.3 Stylized facts: Tracing the cohort of New Entrants

We focuses on the entry and growth dynamics of new exporters. This is important to identify precisely the evolution of exporters once they enter into the foreign markets and avoid the evolution of continuing exporters. In each year after 2004, it is possible to observe how many exporters per cohort of entry survive until 2013[8]. Table 4 shows the dynamics of new exporters and underscores an extremely important fact on their survival.

A vast majority of the new exporters do not survive for more than one year. For example, of the 1,791 exporters who began exporting in 2005, only 672 made it to 2006 (representing a death rate of 62% or a probability of survival of just 38%). However, of the 344 still around in 2012, only 27 had exited in 2013, representing a much lower risk of failure (or a death rate of just 8.0%). Across the years, the rate of exit in the first year is very high (i.e. approximately, 62%

[7] The appendix contains the 8 broad sectors constructed from HS 2 digit products.

[8] Note for the multiple entry, we count any such re-entry as a new and independent firm-year relation and trace its survival after re-entry.

to 71%). The high attrition rate has also been documented by Cadot et al., (2013) for Mali, Malawi, Senegal and Tanzania, where they found exit rates of 59% for Senegal, 54% for Tanzania, 42% for Mali and 68% for Malawi. Table 5 presents the number of exporters, total sales per type and the average export value per exporter.

Total exports for Kenya have increased from US$ 2,686.0 million in 2005 to US$ 5,350.3 million in 2013, growing by approximately 99%. Out of this expansion, the incumbents in 2004 accounted for approximately 43.2 per cent, while the post 2004 entrants account for about 56.7 per cent. Thus, year-on-year-variation in exports is driven by the existing firms selling existing products to existing destinations (intensive margin), but in the long run, the entry of new firms and entry in new markets (extensive margin) is important for growth in exports. On the lower panel, the average value of exports per firm increases substantially after the first year. Even though many firms exit within their first year of entry, total exports by the cohort do not fall accordingly. This may imply that new entrants grow fast once they manage to survive beyond the first year.

To further demonstrate the distribution of the export value after the birth year, we use the kernel density plot to show that the value of exports per exporter increases after the birth year. Figure 2, below shows the distribution of export value for the cohort of exporters that started to export in 2005.

It can be observed that the kernel density function show the distribution of total export value per exporter for the cohort of firms in 2005 shifted to the right. The rightward shift in the distribution is substantial within the initial three years of stay in international markets, after which it remains somewhat stable as the distribution between 2007 and 2012 hardly changes. This appears to suggest that export growth stagnates within two years of entry after which it remains virtually constant, a fact that is new within our data. Arkolakis (2011) and Mayer et al. (2014) argue that entry and stagnation reflect the fact that there are additional costs for reaching out to new customers in the destination market and only the most productive firms are able to cover these costs. This explains why firms incur fixed cost of entry to a market but keep exporting very small amounts of exports.

Finally, the new entrants into exporting are expected to start small in terms of products and the number of countries they export to. However, once they survive, they diversify their export portfolio in terms of the number of products and the number of countries served. We investigate this fact using cumulative density functions (CDFs) plot on the diversification patterns of the cohort of exporters that started to export in 2005. It can be noted from Figure 3, that there is a rightward shift in the number of products exported and in the number of destination countries served per surviving exporters over time.

This provides evidence to support the fact that maintaining an export relationship is associated with increase in firm exports along the extensive margins. This may occur due to learning from peers exporting to same markets and observing the opportunity of profit in new products and in new destinations (Eaton et al., 2009). In the next section we discuss the estimation strategy. The table

7 below presents the summary statistics for the main variables to be used in the analysis[9].

The key information from this table allows us to check the dispersion of key variables around the means and identify outliers. Spell duration and the Failure dummy (=1) are also very critical variables. The mean Spell (trade) duration is 4.1 years with a standard deviation of 2.8 years. The Failure dummy is an indicator equal to 1, if a trade relation fails and zero otherwise. It is also possible to switch between a failure and a non- failed state. This reflects exporters who record multiple spells in the trade data.

4 Results and Discussion

4.1 Non-parametric analysis

We start by presenting the non-parametric estimates for the probability of a trade relations failing in period $t + 1$ having survived through period t. The non-parametric estimator gives us a rough guess of the shape of the raw hazard rates, before considering the effects of any explanatory variables. The survival function is a series of declining horizontal steps graph and the area under the curve provides the mean duration of an export relationship.

Figure 4 show the Kaplan-Meier survival estimates for the duration of trade for the population of exporters that started to export in 2005 (New entrants).

From the graph, approximately 52% of new export's trade relations die within the first year of entry, while approximately 75% die within the first five years of entry. Overall, the hazard rate fall as export spells grow older. Figure 5 presents the differences in survival for firms depending on whether the initial value of a transaction is large or small, as well as whether the product is classified as differentiated or homogeneous.

It can be observed that exporters whose initial transaction is large (greater than US$50,000) have a better chance of surviving in the international markets relative to those whose initial transactions is below US$ 10,000. Furthermore, exporting differentiated products provides a better chance of surviving compared to homogenous products.

We also explore differences in survival across exporter characteristics such as the number of products, the number of destinations served, the main sector of exporter and whether or not the exporter serves, mainly the COMESA market.

Figure 6 summarises the estimates. In the first quadrant, exporters with a single product have a low chance of survival relative to those with three or twenty products. The second quadrant shows that exporters with a wider destination scope appear to perform better in terms of survival rate relative to single destination exporters. The third quadrant shows that exporters belonging to the chemicals sector have a better survival rate relative to the other sectors and finally the fourth quadrant shows that exporting to both COMESA and rest of

[9] In the appendix we describe the construction of the key variables.

the world is associated with better survival rate relative to exporting to rest of the world only.

4.2 Regression Results

We estimate Equation (3) using the Cox proportional hazard method. The results in Table 7 shows that the Cox PH approach yields a qualitatively expected relationship between the hazard rate and the covariates considered.

An increase in the initial value of trade, dealing in differentiated products, exporting a larger number of products (scale) to many destinations (geographic scope) are all associated with a reduction in the probability that a trade relationship will end some point in future, having survived to date. Likewise, if the number of firms, exporting a similar HS six digit to the same destination increases, this is associated with the probability that a trade relationship will survive, underscoring the importance of firm network effects and signalling across firms. Targeting the COMESA market is associated with better chances of survival but the relationship is not statistically significant.

The validity of the proportional hazard result relies on a key assumption that the hazard rate is proportional (Brenton et al., 2009). We used the Schoenfeld (1983) residuals, a post estimation test after the Cox PH regression, to test for the null that the hazard rate is proportional (Hess and Persson, 2011). The test follows a chi-square distribution and from the global test in Table 8, the null of proportionality in the hazard function is strongly rejected at 1% level of significance.

With the rejection of the assumption of proportionality the cox PH results may not be valid. Thus we consider using discrete choice model specified in Equation (4) to model the probability of failure, conditional on firm characteristics. Table 9 reports the results from the linear probability model (column 1) together with results from the logit with random effects (column 2) and fixed effects (column 3).

The LPM results (column 1) may lead to predicted probabilities that are not bound within the unit interval (Soderborm and Teal, 2014 p. 230). The LPM estimation also implies presence of heteroscedasticity and biased standard errors (Soderbom et al., 2014; Cameron & Trivedi, 2009; Horrace & Oaxaca, 2006). This latter problem is usually corrected through use of heteroscedasticity robust standard errors.

The panel logit with fixed effects assumes that unobserved firm effects are correlated with observed heterogeneity and uses a within transformation to eliminate the unobserved time invariant factors that affects the probability of failure but not controlled for (Lejour, 2015). The panel with random effects on the other hand, acknowledges the presence of unobserved heterogeneity among exporters but assumes that such unobserved firm specific effects are not correlated with the observed firm characteristics. The results from these two models are contained in column (2) and (3).

To choose between the fixed effects and the random effects, we used the Hausman (1978) test The null that there is no correlation between unobserved firm specific effects and the included covariates is rejected at 1% level (see (Hausman, 1978). This implies we should control for the unobserved firm fixed effects. The logit with fixed effects yields consistent but inefficient estimator (Cameron and Trivedi, 2009 244-245). However since the variation in the outcome variable (Failure dummy) is largely driven by the differences across exporters, rather than from within exporters, this implies that fixed effects may lead to considerable loss of efficiency. A number of studies, tend to use random effects when modelling the probability of failure (Cadot et al., 2013, Lejour, 2015). There is an additional complication when working with panel logit with fixed effects. While this method ensures that predicted probabilities falls within the unit interval, the computation of the average marginal effects (ME) is not trivial because the firm fixed effects are not estimated (Cameron and Trivedi, 2009:627). A proposal out of this problem is to use the log of odds-ratio interpretation for the logit model[10] (Barrera-Gomez & Basagana, 2015). As a compromise we present and interpret both the ME computed at $\alpha_i = 0$ and the odds ratio after logit with fixed effects.

Column (2) a 10% increase in the initial fob value is associated with a reduction in the probability of failure by 0.4 percentage points, the difference in the probability of failure is lower by 5.0 percentage points for exporters who export differentiated products relative to those who export homogeneous products. A 10% increase in the number of products (number of countries) by an exporter is associated with a reduction in the probability of failure by 0.5 (2.5) percentage points. A 10% increase the average number of exporters exporting a similar product to the same destination is associated with a reduction in the probability of failure by 0.3 percentage points. Regarding the COMESA dummy, the difference in the probability of failure is 0.6% lower for firms that export mainly to COMESA relative to exporters to rest of the world only, although the coefficient is not statistically significant.

Column (3) shows the results from the fixed effects, which are remarkably similar to the LPM and consistent with results of the random effects but the magnitude of the marginal effects are small. A 10% increase in the initial fob value is associated with a reduction in the probability of failure by 0.08 percentage points. A 10% increase in the number of products (number of countries) by an exporter is associated with a reduction in the probability of failure by 0.2 (0.5) percentage points while a 10% increase the average number of exporters exporting a similar product to the same destination is associated with a reduction in the probability of failure by 0.02 percentage points. The COMESA dummy has a positive sign and is significant at 10%. This is contrary to what we hoped for and to the non-parametric results outlined earlier. This contradictory outcomes is revisited in the robustness test.

Column (4) shows the results from the odds ratio after fixed effects and are qualitatively similar with the average marginal effects after the logit model.

[10] Odds ratio and logit coefficients are related. $Ln(\frac{P}{1-p}) = \log(odd\ sratio) = \alpha_i + X_{it}'\beta$. The odds ratio can be obtained by simply taking the exponent. $\frac{\partial Ln(\frac{P}{1-p})}{\partial x_j} = \beta_j$.

The odds ratio after logit show that a 100% increase in the initial fob value is associated with the odds of failure being multiplied by a factor of 0.941 (or a reduction in the odds of failure by 6%). An increase in the number of products exported by 100% is associated with a reduction in the odds of failure by 16%. An increase in the number of destination countries served by 100% is associated with a reduction in the odds of failure by 28%.

4.3 Robustness test

We consider two sets of robustness to the above results. Firstly, we exclude exporters with multiple export spells. The presence of multiple spells means two or more events of interest (failure) occur to the same exporter. In this case, failure times may be correlated within firms where the first failure is likely to be followed by a second failure (Brenton, Cadot & Pierola, 2012; Martincus & Carballo, 2009). We follow an approach suggested in the World Bank study by Brenton et al. (2012) to exclude exporters with multiple spells. Table 10 shows the results. With exclusion of multiple spells, logit with fixed effects is not estimable due to perfect collinearity. The results are very similar with the findings in Table 10.

The sign on COMESA dummy is now in the correct direction, showing that if an exporter's main market is COMESA, this reduces the probability of failure, but it is still not statistically significant. Secondly, a key concern in the results in Table 9 is that the probability of failure and firm export behaviours are contemporaneously correlated. To reduce this reverse causality we assume that the right hand side variables are pre-determined. Table 11 shows the results.

The results are broadly consistent showing that the initial value of a deal, a exporting a large number of products, and exporting to many countries is associated with a high chance of survival in the international markets. Exporters that export mainly to COMESA regional market have a higher chance of survival relative to those who export to the rest of world. The coefficient on differentiated product and the proxy measure of firm networks are no longer statistically significant.

5 Conclusion

This paper set out to answer two key questions. Exploring the growth in exports of new exporters after entry into international markets and examine the factors associated with the probability of survival in international markets. The findings show that for new exporters, once the trade relationship manages to survive through the initial year of entry, it grows and expands overtime contributing substantially to the nation's exports. However, survival beyond the first year is only for a few. Out of the cohort of export entrants in 2005, approximately 52% exit in the first year. This is a steep exit rate compared to findings in other jurisdictions (Besedes and Prusa, 2006a; Nitsch, 2009; Cadot et al., 2013; and Lejour, 2015).

Furthermore, new entrants start small in terms of product and geographic scope. However, they subsequently diversify their export portfolio in terms of the number of products and the number of countries served. On the factors associated with the probability of survival, we show using non-parametric estimation (KM estimates) that the large the initial value of an export transaction, exporting differentiated products , a large product scale and a wider geographic scope of exports are associated with higher probability of survival. Similarly belonging to chemicals sector is associated with better chances of survival relative to exporting textile products.

The non-parametric results are confirmed in the parametric analysis using Cox PH and logit with fixed and random effect regressions. In particular, we find that a 10% increase in the initial value of export transaction is associated with a reduction in the probability of failure by 0.4 percentage points, the difference in the probability of failure is lower by 5.0 percentage points for exporters who export differentiated products relative to those who export homogeneous products. A 10% increase in the number of products (number of countries served) by an exporter is associated with a reduction in the probability of failure by 0.5 (2.5) percentage points. Thus a one more destination for a firms' product represents a substantial move and has a greater impact on survival compared to adding a product. A firm needs to add to its portfolio at least 5 (=2.5/0.5) products to match the benefits of adding one new destination. Our results remain robust to a number of consistency tests.

This study is not without limitations. We point out four and propose future research issues. Firstly, the nature of transaction level data, however, implies that we are basing our analysis on a selected sample, i.e. customs data covers only exporters. This implies that the estimated results on the determinants of the probability of survival are only valid for current and active exporters. Secondly, although the use of the panel logit with fixed effects eliminates the time invariant firm characteristics, which reduces the bias associated with omitted variables, it is still possible that our results are afflicted by time varying unobserved firm characteristics. The current study, could therefore be extended by controlling for as many firm characteristics as possible (Gorg et al., 2008). In particular, our study lacks a panel of firm characteristics such as total factor productivity or number of employees, to merge into the transaction dataset. A feasible strategy is to engage the Authorities in Kenya to exploit other administrative dataset such as annual returns to obtain firm characteristics.

Thirdly, we show descriptively that the growth of new export entrants stagnates after the third year of stay in export markets. This suggests that there may be additional costs for reaching out to new customers in the destination market and this constitutes a hurdle to growth of firms in their export status .(Mayer, Melitz & Ottaviano, 2014; Arkolakis, 2011). However, econometrically we do not estimate the factors associated with this behaviour. Future research could explore the role of market access costs and firm operation constraints such as access to credit. Fourth and final, there is scope to explore more the product and destination diversification of export portfolio. For example, it would be interesting to see if the added products per firm are within the same sector or across sectors. Likewise, the added countries per firm could be split into those that are culturally distant from Kenya versus those that are not. These issues remain unaddressed in the current paper.

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Table 1: Summary statistics of Kenya's exports over time

	Mean Exports in US$	Standard Dev.	# of Exporters	# of HS6 Products	# of Countries	Total in US$ mn Data	Total US$ mn KNBS	Dev. from KNBS
2004	616,775	3,536,010	3250	3006	179	2,005	2,056	-2.5
2005	686,931	4,193,324	3918	3250	172	2,691	2,899	-7.2
2006	719,102	4,201,505	4580	3439	169	3,293	3,288	0.2
2007	882,964	4,909,878	4722	3539	168	4,169	4,187	-0.4
2008	931,313	6,049,724	4563	3403	159	4,250	4,153	2.3
2009	929,226	5,617,960	4678	3354	157	4,347	4,269	1.8
2010	912,695	5,562,038	4851	3398	160	4,427	4,770	-7.2
2011	1,078,075	6,651,990	5319	3517	166	5,734	5,693	0.7
2012	1,091,542	6,658,711	5175	3456	163	5,649	5,578	1.3
2013	1,102,140	6,318,799	4968	3419	164	5,475	5,280	3.7
2004-2013	895,076	5,369,994	4602	3378	166	4,204	4,217	-0.7

Notes: Computed from the Customs data. Deviations are in % from KNBS data.

Table 2: Transition in the top 15 destinations for exports, 2004 to 2012

Rank	2004	[%]	2012	[%]
1	UK	[13.5]	Uganda	[12.1]
2	Uganda	[10.4]	UK	[8.4]
3	Netherlands	[10.4]	Tanzania	[8.3]
4	Tanzania	[7.1]	Netherlands	[6.4]
5	Pakistan	[7.0]	UAE	[5.5]
6	Egypt	[4.0]	USA	[5.4]
7	Germany	[3.0]	Pakistani	[4.9]
8	DR. Congo	[2.6]	Sudan	[4.8]
9	India	[2.57]	Egypt	[4.4]
10	France	[2.5]	Somalia	[3.8]
11	Sudan	[2.4]	DR. Congo	[3.4]
12	USA	[2.2]	Rwanda	[2.9]
13	Afghanistan	[1.9]	Afghanstani	[2.6]
14	Somalia	[1.7]	Germany	[2.0]
15	Belgium	[1.6]	India	[1.5]

Notes: The rank is based on the share of a destination country's purchase relative to Kenya's total exports for 2004 and 2012, of US$ 2,691 million and US$ 5,649 million, respectively. The shares in % are in the squared brackets.

Table 3: Sectorial breakdown of exports for 2005 and 2012

HS-section	2005		2012	
	No. firms	% of value	No. firms	% of value
Live animals	162	12.3	353	5.7
Vegetables	783	28.1	826	21.6
Fats and oils	33	1.9	59	4.7
Food beverages and tobac.	346	29.9	501	35.2
Mineral products	204	9.7	334	6.9
Chemicals	386	6.7	604	9.4
Plastics	251	5.2	477	5.9
Leather	55	1.1	130	0.7
Wood	270	0.3	267	0.3
Pulp and paper	170	0.6	331	1.3
Textile and clothing	578	1.3	206	2.3
Footwear	16	0.3	20	0.1
Stone glass and cement	60	0.3	91	0.2
Jewelry	39	0.4	53	3.0
Base metals	180	1.4	268	2.1
Machinery	228	0.3	466	0.5
Transport Equipments	76	0.2	91	0.1
Optics	34	0.02	47	0.1
Arms	2	0.02	0	0
Miscellaneous	20	0.02	30	0.2
Works of art	25	0.02	21	0
Total	3,918	100	5,175	100

Note: Computed using customs data reduced to 21 sectors out of 2-digit HS classification. The total export value is US$ 2 691.7 million and US$ 5 649.5 million for 2005 and 2012, respectively.

Table 4: Entry and Exits of a cohort of firms, 2005-2013

Number of new exporters by initial year of entry, 2005-2013									
	2005	2006	2007	2008	2009	2010	2011	2012	2013
2005	1791								
2006	672	1954							
2007	521	746	1711						
2008	451	567	601	1314					
2009	415	496	436	413	1337				
2010	391	456	385	300	446	1356			
2011	373	434	384	277	367	436	1592		
2012	344	383	332	232	307	361	463	1373	
2013	317	332	299	212	267	305	340	406	1203
Cummulative exit rate, relative to the entry year									
	2005	2006	2007	2008	2009	2010	2011	2012	2013
2006	0.62								
2007	0.71	0.62							
2008	0.75	0.71	0.65						
2009	0.77	0.75	0.75	0.69					
2010	0.78	0.77	0.77	0.77	0.67				
2011	0.79	0.78	0.78	0.79	0.73	0.68			
2012	0.81	0.80	0.81	0.82	0.77	0.73	0.71		
2013	0.82	0.83	0.83	0.84	0.80	0.78	0.79	0.70	0.00
Exit rate relative to prior year, within a cohort									
	2005	2006	2007	2008	2009	2010	2011	2012	2013
2006	0.62								
2007	0.22	0.62							
2008	0.13	0.24	0.65						
2009	0.08	0.13	0.27	0.69					
2010	0.06	0.08	0.12	0.27	0.67				
2011	0.05	0.05	0.00	0.08	0.18	0.68			
2012	0.08	0.12	0.14	0.16	0.16	0.17	0.71		
2013	0.08	0.13	0.10	0.09	0.13	0.16	0.27	0.70	--

Notes: The column date indicate the first year of entry. The upper panel is the number of new exporters by their first year of entry. The middle panel gives the cumulative exit rates relative to the number of entries in the first year, while the lower column gives the exit rate relative to the previous year, within a cohort.

Table 5: Evolution of total and average exports per exporter

Number of new exporters by first year of entry2005-2013

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Toal
2004	3 223										3 223
2005	2 097	1 791									3 888
2006	1 925	672	1 954								4 551
2007	1 713	521	746	1 711							4 691
2008	1 606	451	567	601	1 314						4 539
2009	1 552	415	496	436	413	1 337					4 649
2010	1 487	391	456	385	300	446	1 356				4 821
2011	1 422	373	434	384	277	367	436	1 592			5 290
2012	1 354	344	383	332	232	307	361	463	1 373		5 149
2013	1 263	317	332	299	212	267	305	340	406	1 203	4 944

Total export vaue in US$ million

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
2004	2 003.1										2 003.1
2005	2 560.7	125.5									2 686.3
2006	2 831.6	270.6	182.6								3 284.8
2007	3 446.1	324.6	238.4	139.8							4 148.8
2008	3 442.4	271.9	185.4	247.4	85.0						4 232.2
2009	3 442.6	274.6	186.4	247.7	89.1	74.9					4 315.3
2010	3 321.6	288.6	202.0	218.7	90.4	105.5	150.3				4 377.3
2011	4 281.2	414.7	233.4	272.3	90.0	152.9	137.3	114.4			5 696.2
2012	4 002.5	357.5	220.4	290.7	85.6	99.8	182.7	163.8	134.9		5 537.9
2013	3 721.2	388.8	186.0	242.4	78.8	91.5	150.6	202.2	211.0	77.7	5 350.3

Average export value per firm in US$ "000"

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
2004	621.5										621.5
2005	1 221.1	70.1									690.9
2006	1 471.0	402.6	93.5								721.8
2007	2 011.7	623.0	319.5	81.7							884.4
2008	2 143.5	602.9	327.0	411.7	64.7						932.4
2009	2 218.1	661.8	375.9	568.2	215.7	56.0					928.2
2010	2 233.8	738.2	443.1	568.1	301.3	236.6	110.8				908.0
2011	3 010.7	1 111.8	537.9	700.0	324.9	416.5	315.0	71.8			1 076.8
2012	2 956.1	1 039.2	575.5	875.7	369.1	325.0	506.1	353.7	98.2		1 075.5
2013	2 946.3	1 226.4	560.4	810.6	371.7	342.6	493.6	594.8	519.8	64.6	1 082.2

Notes: the upper panel is the number of new exporters by their first year of entry. The middle panel is the total export value per cohort in US$ million and the lower panel contains the average export value per exporter in US$ “000”.

Table 6: Summary statistics of the key variables of interest

Variable	N	Mean	sd	Min	Max
Failure dummy	28,103	0.40	0.49	0.00	1.00
Spell duration	28,103	4.13	2.82	1.00	9.00
Log(Initial fob_value)	28,103	9.20	2.49	-1.46	18.29
Rauch(1=differentiated)	28,103	0.27	0.44	0.00	1.00
Number of products	28,103	5.21	13.28	1.00	299
Number of countries	28,103	1.79	2.21	1.00	65
Avg.number of firms-sameHS6 to j	28,103	20.79	43.96	1.00	319
Avg.number of firms-product to j	28,103	4,464	4,549	1.00	15,532
COMESA (=1, Comesa main market)	28,103	0.58	0.49	0.00	1.00

Notes: Computed from custom data.

Table 7: Baseline regression: Cox Proportional Hazard (PH)

Dependent variables:	Pr(fail=1|t+1)	Pr(fail=1|t+1)
	Cox-PH	Cox-PH
	(1)	(2)
Firm characteristics		
Log(Initial fobvalue)	-0.0550***	-0.0537***
	(0.00393)	(0.00393)
Rauch(=1, if product differentiated)	-0.0751***	-0.0817***
	(0.0226)	(0.0226)
Log(Number of products)	-0.0294***	-0.0345***
	(0.0106)	(0.0105)
Log(Number of countries)	-0.584***	-0.584***
	(0.0338)	(0.0337)
COMESA (=1, Comesa main market)	-0.00987	-0.0160
	(0.0194)	(0.0175)
Firm Networks		
Log(avg.number of firms-sameHS6 to j)	-0.0249***	
	(0.00536)	
Log(avg.number of firms-product to j)		-0.0419***
		(0.00635)
Year and sector dummies		
Year FE	YES	YES
Sector FE	YES	YES
Observations	12,413	12,413
Log likelihood ratio	-80857	-80852
No. of firm clusters	12412	12412
No. of time at risk	28864	28864
No. of failures	9096	9096

Notes: All estimations are obtained using the Cox PH method where the dependent variable is the probability of failure in period t+1, having survived through period t. All continuous variables are in logs. The standard errors are clustered at the firm level. The asterisk indicates the level of significance *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Test on the proportionality of hazard function-Schoenfeld residuals test

	rho	chi2	df	Prob>chi2
Log(Initial fobvalue)	-0.00178	0.010	1	0.905
Rauch(=1, product differentiated)	0.00499	0.130	1	0.722
COMESA (=1, comesa main market)	0.0349	5.870	1	0.015
Log(Number of products)	0.0617	25.58	1	0.000
Log(Number of Countries)	0.00219	0.020	1	0.880
Log(avg.number of firms-product to j)	-0.00956	0.390	1	0.531
Global test		55.87	21	0.000

Notes: Obtained as post-estimation test after the Cox PH.

Table 9: The probability that a relationship fails: panel estimation

Dependent variables:	Pr(fail=1|X)	Pr(fail=1|X)	Pr(fail=1|X)	Odds ratio
	LPM-FE	Xtlogit-RE	Xtlogit-FE	after logit
	(1)	(2)	(3)	(4)
Log(Initial fobvalue)	-0.00851*	-0.0440***	-0.00851*	0.941**
	(0.00455)	(0.00200)	(0.00456)	(0.0256)
Rauch(=1, if product differentiated)		-0.0502***		
		(0.0112)		
Log(Number of products)	-0.0282***	-0.0515***	-0.0248***	0.837***
	(0.0107)	(0.00502)	(0.00932)	(0.0526)
Log(Number of countries)	-0.0418***	-0.256***	-0.0455**	0.722***
	(0.0161)	(0.0100)	(0.0179)	(0.0880)
COMESA (=1, Comesa main market)	0.0243	-0.00667	0.0345*	1.281*
	(0.0223)	(0.00965)	(0.0199)	(0.179)
Log(avg.number of firms-sameHS6 to j)	7.48e-05	-0.0353***	-0.00249	0.982
	(0.0105)	(0.00385)	(0.00795)	(0.0544)
Observations	22,255	20,165	4,888	4,888
Number of id	13652	12,526	2,056	2,056
R-Squared	0.809			
Log likelihood ratio		-11428	-1239	-1239
Firm FE	YES	NO	YES	YES
Sector FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Notes: All estimations are obtained from a panel regression of the dummy=1, if the relationship ends against observable firm characteristics. All continuous variables are in logs. Column (2-3) results is the average marginal effects. Robust standard errors in brackets. The asterisk indicates the level of significance *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Robustness to exclusion of multiple spells

Dependent variables:	Pr(fail=1|X)	Pr(fail=1|X)
	LPM-pool	Xtlogit-RE
	(1)	(2)
Log(Initial fobvalue)	-0.0408***	-0.0476***
	(0.00173)	(0.00201)
Rauch(=1, if product differentiated)	-0.0275***	-0.0301***
	(0.00974)	(0.0110)
Log(Number of products)	-0.0505***	-0.0493***
	(0.00394)	(0.00493)
Log(Number of countries)	-0.183***	-0.249***
	(0.00732)	(0.00990)
COMESA (=1, Comesa main market)	-0.00430	-0.00552
	(0.00817)	(0.00970)
Log(avg.number of firms-sameHS6 to j)	-0.0252***	-0.0288***
	(0.00327)	(0.00390)
Observations	16,505	14,783
R-Squared	0.313	
Log likelihood ratio		-7857
Sector FE	YES	YES
Year FE	YES	YES

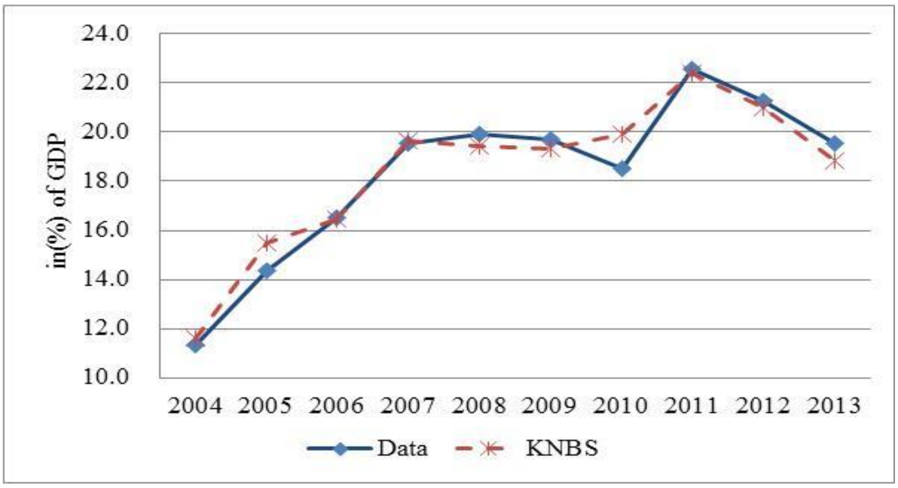
Notes: All estimations are obtained from a panel regression of the dummy=1, if the relationship ends against observable firm characteristics. All continuous variables are in logs. Column (2) results is the average marginal effects after logit with random effects. Robust standard errors in bracket. The asterisk indicates the level of significance *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Robustness to lagged right hand side variables

Dependent variables:	Pr(fail=1|X)	Pr(fail=1|X)
	LPM-pool	Xtlogit-RE
	(1)	(2)
L.Log(Initial fobvalue)	-0.0256***	-0.0298***
	(0.00242)	(0.00300)
L.Rauch(=1, if product differentiated)	0.00195	0.00300
	(0.0114)	(0.0136)
L.Log(Number of products)	-0.0166***	-0.0182***
	(0.00533)	(0.00674)
L.Log(Number of countries)	-0.0534***	-0.0705***
	(0.00889)	(0.0121)
L.COMESA (=1, Comesa main market)	-0.0283**	-0.0319**
	(0.0140)	(0.0159)
L.Log(avg.number of firms-sameHS6 to j)	-0.00204	-0.00239
	(0.00495)	(0.00532)
Observations	7,629	6,944
R-Squared	0.097	
Log likelihood ratio		-4125
Sector FE	YES	YES
Year FE	YES	YES

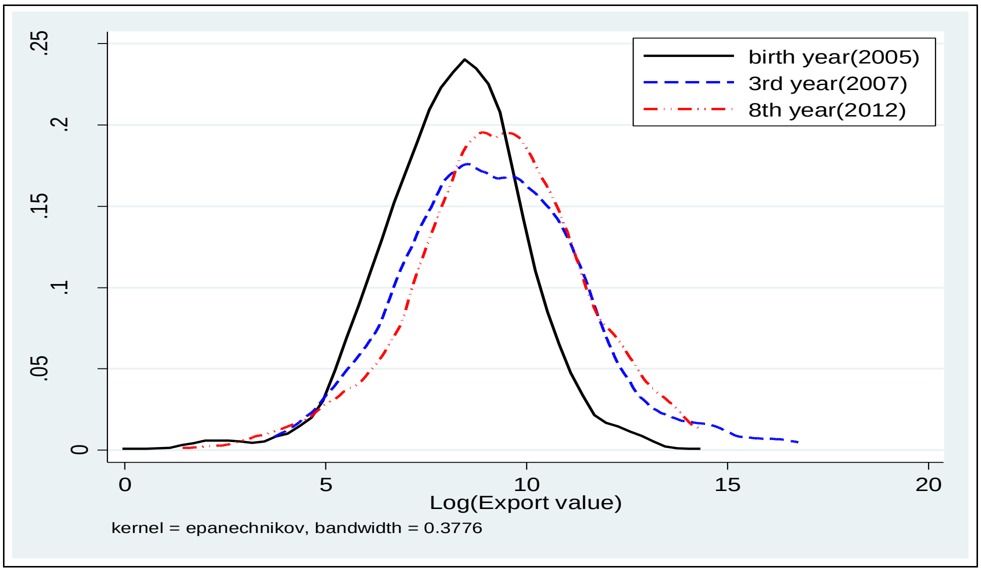
Notes: All estimations are obtained from a panel regression of the dummy=1, if the relationship ends against observable firm characteristics. All continuous variables are in logs. Column (2) results is the average marginal effects after logit with random effects. Robust standard errors in bracket. The asterisk indicates the level of significance *** p<0.01, ** p<0.05, * p<0.1.

Figure 1: Kenya's export value as a percentage of GDP



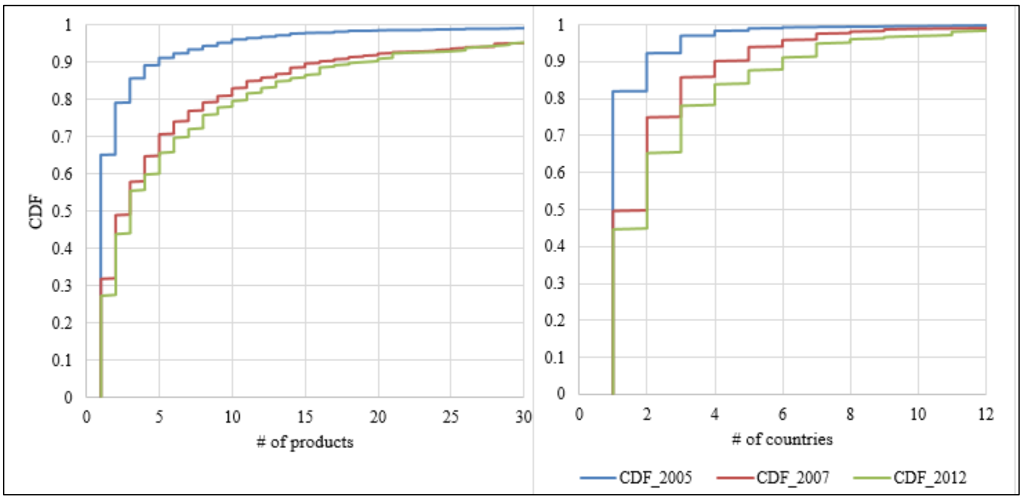
Notes: own computation using KRA data and KNBS data

Figure 2: Distributions of export value for the cohort of entrants in 2005



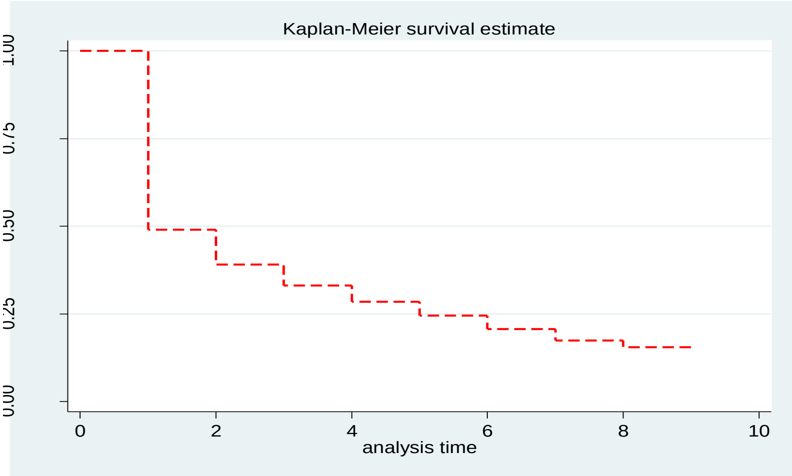
Notes: Computed from Customs data

Figure 3: CDFs for the number of products and destinations, for 2005 Cohort



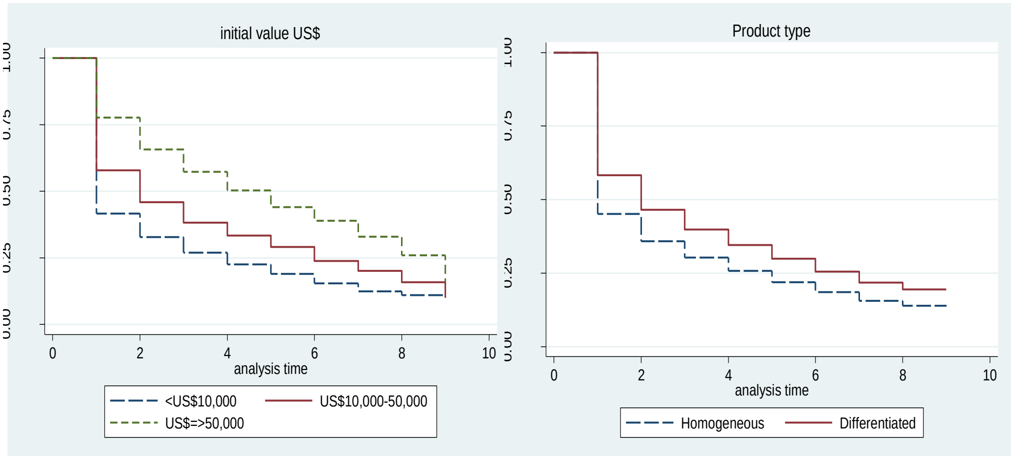
Notes: Computed from Customs data

Figure 4: The duration of export relations for the new exporters



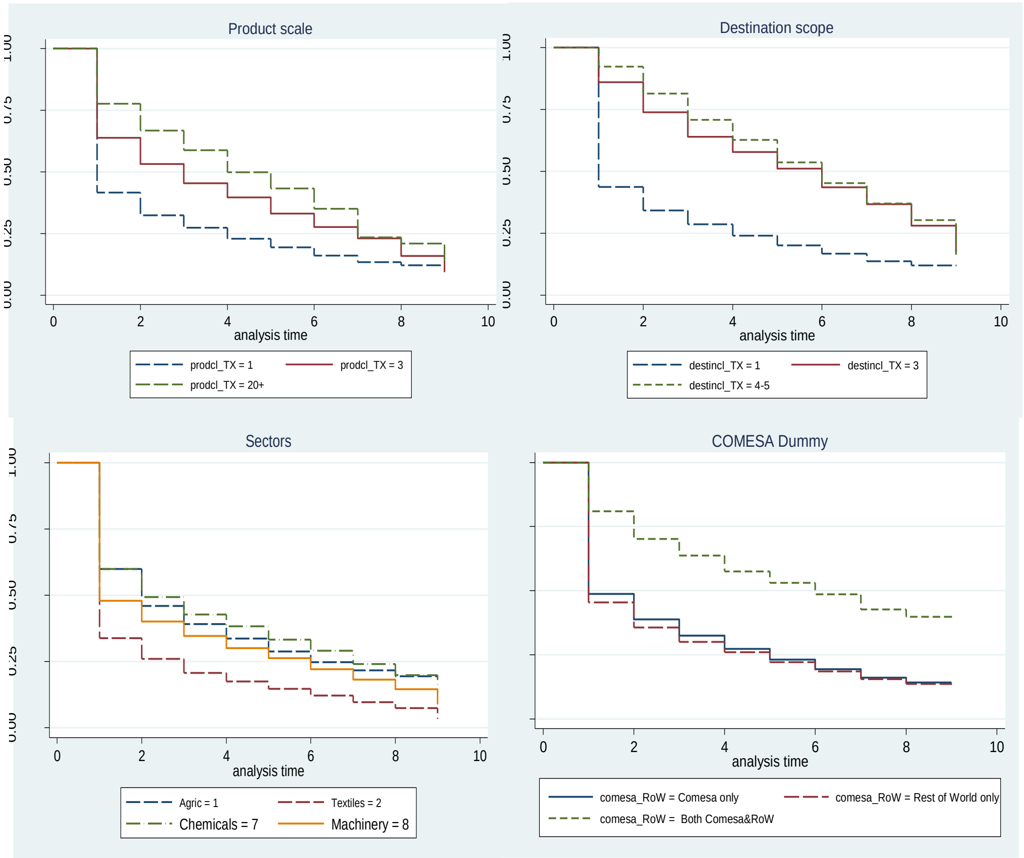
Notes: The y-axis is in probability scale. The x-axis contains the duration of trade. The graph is a series of declining steps showing declining hazard rate (or increasing survival) as export spell grow older.

Figure 5: Initial value of a transaction and differentiated products



Notes: The y-axis is in probability scale. The x-axis contains the duration of trade. The graph is a series of declining steps showing declining hazard rate (or increasing survival) as export spell grow older.

Figure 6: Kaplan-Meier survival estimator over exporter characteristics



Notes: The y-axis is in probability scale. The x-axis contains the duration of trade. The graph is a series of declining steps showing declining hazard rate (or increasing survival) as export spell grow older.

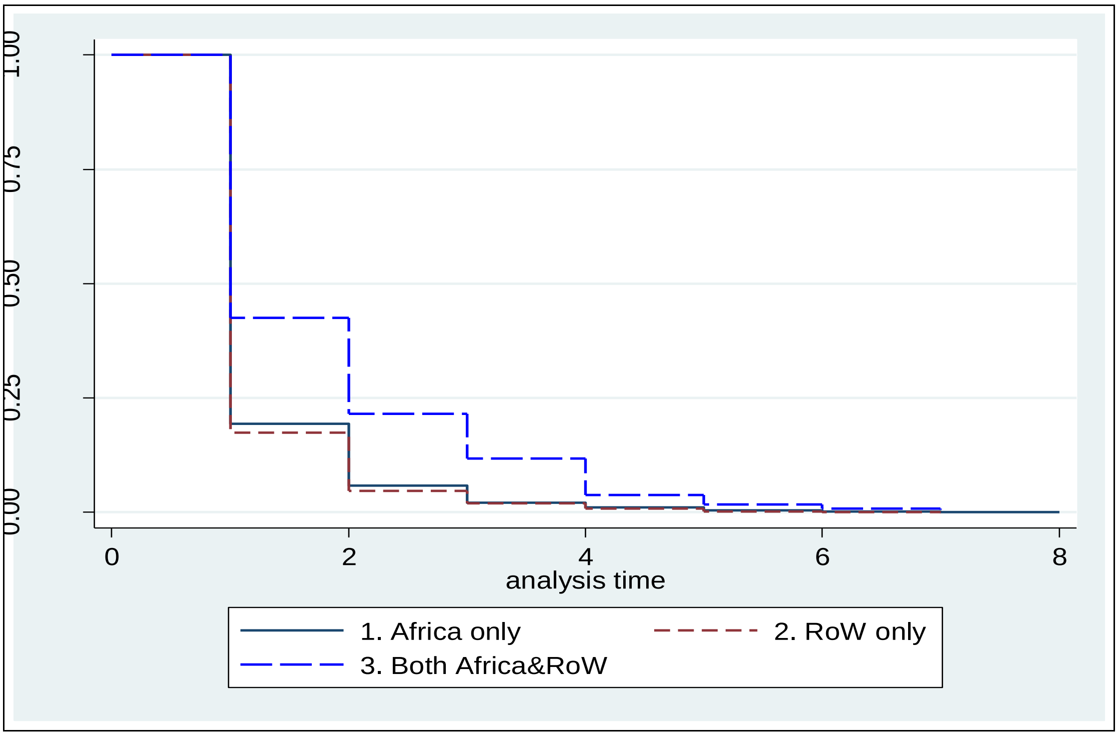
Appendix

Table 12: Classification of 2-digit HS products into broad sectors

Sector	Name	HS chapters included	Total
1	Agriculture, meat, dairy & seafood	HS 01-10, 12-14	14
2	Textiles, apparel, leather & footware	HS 41-42, 50-65	18
3	Extractive industries	HS 25-27,68-71	7
4	Other industries	HS 37, 43, 49, 66-67,90-99	15
5	Iron, steel & other metals	HS 26,72-83	12
6	Food, beverages, tobacco, wood & paper	HS 11,15-24,44-48	16
7	Chemicals, plastics & rubber	HS 28-36, 38-40	12
8	Machinery, electronics & transportation equipments	HS 84-89	6

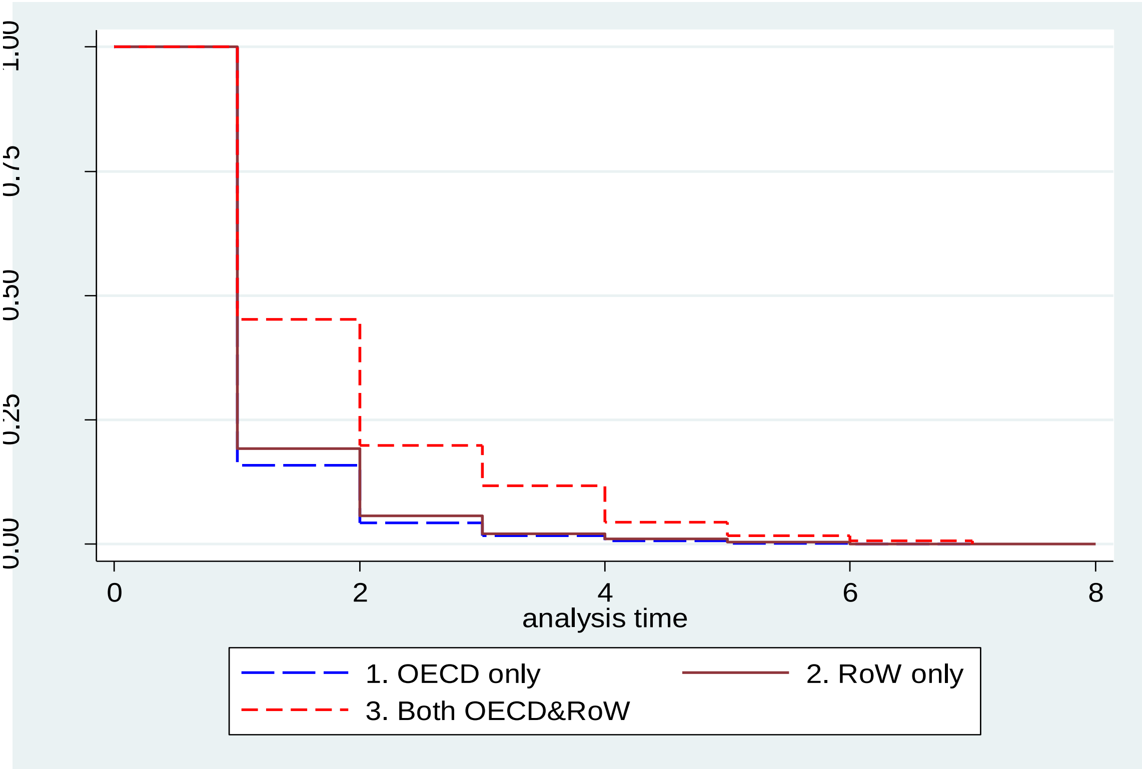
Notes: Own classification.

Figure 7: Kaplan-Meier function for exporters that export mainly to Africa vs Rest of World (RoW)



Notes: exporters that exports mainly to both Africa and rest of World performs better than those who either export to Africa only or to rest of World only. This is consistent with the KM estimates for the COMESA market in Figure 6.

Figure 8 Kaplan-Meier function for exporters that export mainly to OECD vs Rest of World (RoW)



Notes: exporters that exports mainly to both OECD and rest of World performs better than those who either export to OECD only or to rest of World only. The hazard rate for those that export to OECD only is especially higher.

Construction of variables used in the estimation

Trade duration (Spell duration)

Using exporter-year trade relationships for the firms that started to export for the first time in 2005-2013, we can trace the length of time until a firm (exporter) ceases to export, an event constituting a failure (or an exit). This event is used to create a dummy variable equal to one, if a firm exits from exporting and zero otherwise. Our definition of exit entails a complete end to export activity by the firm. This has the advantage of avoiding a lot of noise in short durations if a dimension such as firm-product, or firm-destination is used (see Lejour, 2015 for the analysis of survival of firm-product-destination). This way, we emphasises on firm survival in export generally as in Martincus and Carballo (2009), regardless of the length of time that a firm trades a product and/or serves a destination.

Initial export value (Initial fobvalue)

The initial value of a trade relationship is used as a proxy for the level of confidence the exporter originally had in the profitability of that relation (Lejour, 2015; Brenton, Saborowski & von Uexkull, 2009; Besedeš & Prusa, 2006a). To construct this variable, we rely on the fact that we can precisely observe the first year an exporter started to export in the customs database and determine its annual monetary value. The initial value is calculated as a firm's total exports in the first year of entry in US dollars. The logarithmic transformation of this variable is included as a regressor and captures the differences in survival for firms that entered in the same year but with different initial amounts.

Differentiated product dummy

We follow the literature to construct and control for the type of product an exporter deals in, using the Rauch (1999) conservative product classification index to classify products as either homogeneous or differentiated. The Rauch[1] (Rauch, 1999) classification groups traded commodities at both the 3-and 4-digit Standard International Trade Classifications (SITC) rev.2 levels according to differentiated goods (n), reference priced goods (r) and goods traded on an organized exchange (w). The combination of reference priced goods and goods traded on an organized exchange constitutes the homogeneous product classification in this paper. The product type dummy is equal to 1 if the product is classified as differentiated and zero otherwise. In our data, there are some exporters that are multiple product exporters, making it hard to reduce the product type variable to the exporter level. To go around this challenge, we calculated the average share of each 6-digit HS product in a firm's total exports every year and pooled across the entire sample period to obtain the top ranked product per firm. The top ranked product is used to classify an exporter as either dealing in a homogeneous or a differentiated product in a given year.

Number of products and number of destination countries per exporter

The number of products shipped per exporter is used as proxy for firm ability in terms of product scope. It is computed as the count of all 6-digit HS products exported by an exporter in a given year. Similarly, the number of destination countries served by an exporter is used as proxy for firm ability in terms of its geographical scope (Martincus & Carballo, 2009). It is computed as the count of all destination countries served by an exporter in a given year.

Controlling for firm network (avg number of firms-sameHS6)

We constructed a proxy measures for firm network as the average number of firms exporting similar products (HS6) to any destination. This variable constitutes a narrow measure of firm's network. Firms exporting similar products to the same destination can be considered competitors. At the same time, there is a lot of signalling effect and learning from the fortunes of other exporters, including potential for new profit (Eaton et al., 2009). A second proxy is the average number of firms belonging to the same sector and exporting to any destination. This is used in the literature to capture foreign market specific intra industry spillovers (Choquette & Meinen, 2015). By the nature of construction, these variables are correlated and are included in a separate regression.

Common Market for Eastern and Southern Africa (COMESA)

Targeting a specific market may be important for survival (Lejour, 2015). The COMESA regional trade block absorbs up to 52% of Kenya's industrial exports (KNBS, 2013) and may be important for exporter survival. We assign a firm to COMESA as the main market depending on the share of her exports to this trade block. This is done in steps. In step 1 we classify destination countries using COMESA membership status. Step 2 calculates the total exports by firm, year and COMESA dummy and obtains a firm's total exports per year. Step 3 computes the share of a firm's export to COMESA as a ratio to total firm exports. In step 4 we compute the average share of COMESA in a firm's export over time and collapse across the entire sample period. In step 5, if the share is equal to 1, then a firm's main market in period t is COMESA, if the share is 0, then the main market is rest of the world, and anything in-between means the main market is both. In step 6 we create a COMESA dummy=1, if COMESA is the main market and zero otherwise. We expect the COMESA dummy to have a negative and significant relation with the hazard rate.

[1] http://tradesift.com/about-ts/productGroups/Pg-rauch.aspx.