Success and failure of African exporters*

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Abstract

We analyze a novel firm-panel dataset comprised of detailed exports from Malawi, Mali, Senegal, and Tanzania. We document that while there is a large degree of experimentation on export markets, few firms survive many years of sustained exports. Thus our focus lies in the analysis of export survival of unique firm-product-destination combinations in the first year after entry. Firm experience with a product and with a destination as well as agglomeration play an important role in increasing survival probabilities.

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1 Introduction

In their seminal work on export survival, Besedes and Prusa (2006a) showed that the median duration of export spells [1] was only two years. Besedes and Prusa's striking findings have both positive and normative implications.

From a positive perspective, they suggest that there are three, not two margins for export growth. Besides volumes (the 'intensive margin') and diversification (the 'extensive margin'—geographical or product-wise), the third and new margin is export survival (the 'sustainability margin'). From a normative perspective, they suggest, albeit indirectly, that targeting the sustainability margin may be particularly important if getting into export markets involves sunk costs (as suggested by the work of Das, Robert and Tybout 2007), because short survival means repeated entry and hence duplication of sunk costs.

Moreover, Besedes and Prusa (2007) showed that cross-country variation in the extensive margin explains little of the variation in subsequent export growth because of the short average duration of spells. By contrast, both the intensive margin and the sustainability margin matter substantially, suggesting that those should be the margins targeted by export promotion. It is thus important for the design of export-promotion policies to search for robust and potentially policy-related determinants of export survival. The present paper contributes to this search.

At the product level, the determinants of export survival have been explored by a small but growing literature. Besedes and Prusa (2006a) used two panels of U.S. imports, one spanning 1972-88 with tariff-schedule data, the other spanning the 1989-2001 period with 10-digit data (the Feenstra-NBER dataset). In both cases, they found that half of all trade relationships lasted only one year and three quarters lasted three years or less. Once censoring was taken into account, median duration was two years. Most strikingly, this pattern of short duration was robust to aggregation to HS6, even though one would expect interruptions to be smoothed out by aggregation. They also found negative duration dependence, meaning that the hazard rate fell as export spells grew older. This finding, however, has been recently contested by Brenton, Saborowsky and von Uexhull (2010).[2] In terms of survival determinants, Besedes and Prusa found that industrial-country exports lasted longer, and so did exports of machinery, a finding upheld on Asian trade flows by Obashi (2009).

Besedes and Prusa (2006b) dig deeper into the determinants of export survival by testing the

[1] Meaning periods during which U.S.-bound bilateral flows at a highly disaggregated product level went on without interruptions of more than one year.

[2] Brenton et al. argue that the assumption of proportional hazards, which is needed for Cox regressions to be valid, typically does not hold in export-duration samples (this can be verified using a Schˊonfeld test). The alternative Prentice-Gloeckler (1978) estimator suggests no duration dependence. Brenton et al.'s critique applies to the quasi-entirety of the export-survival literature.

implications of a search model proposed by Rauch and Watson (2003) in which importers search for low-cost suppliers and exporters invest optimally in production capacity in the face of moral hazard (risk of non-payment). The model implies that, in general, smaller initial transactions have a lower life expectancy; however, differentiated goods, where moral hazard is highest, involve both smaller initial transactions *and* longer life expectancy.

The model's predictions are upheld by Cox regressions on U.S. import data using Rauch's (1999) index of product differentiation as a regressor. That is, the hazard rate is 23% higher for homogenous products than for differentiated ones, although initial transactions are between 40% and 350% larger. In related work, Besedes (2008) also finds supports for the Rauch-Watson hypotheses on a restricted sample of Rauch-differentiated products where he proxies search costs by the number of potential suppliers and reliability by income levels.

Evidence from non-U.S. trade flows largely confirms the early findings. The determinants of export duration were explored by Nitsch (2009) using Cox regressions on a ten-year panel of German imports at the HS8 level. He found that gravity variables (distance, exporter GDP, common language, common border, etc.) influenced the duration of trade flows pretty much the same way they influenced trade volumes.

Interestingly, he found that the short duration of trade flows held even when flows below 10'000 euros were excluded. Molina and Fugazza (2009) extended the exploration to a nine-year panel of HS6 bilateral trade flows between 96 countries using, as regressors, gravity variables and time required for export procedures (based on the World Bank's *Doing Business* surveys) as proxies for fixed costs. Besides usual findings on the effect of gravity variables and income levels, they found that fixed costs reduced survival.[3]

A similar exercise was carried out on Asian trade flows by Obashi (2009) with largely convergent results. In particular, the 2-to-3 year median survival seems to hold across all samples studied. Obashi also found that vertical trade relationships (involving the sale of semi-finished product) have hazard rates one-third lower than those involving the sale of final goods, and that they are less sensitive to trade costs (e.g. distance or exchange-rate fluctuations).

A smaller number of recent papers have made use of the growing availability of firm-level datasets to shed new light on the determinants of export survival. Moving from the product to the firm level makes it possible to enlarge the set of those determinants in a way that may help understand how export-promotion agencies, for instance, help overcome market failures. Export promotion at the national level contributes, by exploiting economies of scale in the production of information, to overcome imperfect exporter information on destination-market

[3]This is unintuitive: in microeconomics, the shut-down point depends on average *variable* costs, not on fixed costs. However the fixed export costs they consider are incurred for each transaction, although they do not depend on transaction size. They are therefore not really fixed when looking at flows aggregated to the annual level.

demand and requirements. It may also leverage synergies between national exporters to create national brand name'. In some well-known cases, the national brand name is sufficiently visible that State-led promotion is not, or no longer, called for (Columbian coffee, Thai rice, Chilean wines to name but a few). In other cases, provided that synergies do exist, State intervention can help facilitate exporter coordination and make use of existing diplomatic representations (Rose). Gorg et al. (2008) test the implications of the heterogeneous-firm model of Bernard et al. (2006) on a rich panel of 2,043 Hungarian firms spanning the transition from centrally-planned to market economy (1992-2003). The data contains exports at the firm-HS6 level as well as firm characteristics.

They find large product turnover during the period as firms constantly rearrange their product portfolios. They also find longer survival for products located close to the firm's core competencies and to the country's comparative advantage. Alvarez and López (2008) used Tobit regressions to study the determinants of industry-level rates of entry and exit into exporting using a 10-year panel of 5'000 Chilean plants. They found that within-industry heterogeneity, measured (inter alia) by the dispersion of firm-level productivity levels, played an important role in explaining firm turnover in and out of exporting.

By contrast, trade costs, factor intensities, and exchange-rate fluctuations were found to have only marginal impacts. Carballo and Volpe (2008) used a 6-year panel of firm-level Peruvian exports at the HS10 level to explore how diversification strategies (in terms of products and markets) affect the survival of firm-level exporting activity. They found that both geographical and product-wise diversification raised survival, but geographical diversification more so—presumably because it proxies for product quality.

We build on this literature and use transaction-level data obtained directly from customs in a sample of African countries (Malawi, Mali, Senegal and Tanzania) to revisit the issue of export survival at the firm level. Our sample of countries is selected essentially on the basis of data availability and reliability. The data must of course be taken cautiously, as export transactions are imperfectly monitored by customs (exports typically bring no revenue) and African customs suffer from weak statistical capabilities.

As long as the resulting measurement errors are on the LHS of our estimation equation, however, they only introduce noise without biasing estimates. When estimating survival on national samples of export transactions, our unit of observation is a (product x firm x destination x starting year) quartet. For such a quartet, using the well-established empirical regularity that most export spells last for only one or two years, we define survival', our dependent variable, as a dummy variable equal to one when the quartet has positive trade value for more than a year (we time-aggregate our transaction data up to the year level).

We do not have firm characteristics, as our attempts to match customs data with other firm-level

databases stumbled on confidentiality issues and utter un-reliability of some of the available firm data. Therefore we stick to the customs data in our search for determinants of export survival. Our regressors include time effects, industry effects (at the HS2 level), and a number of variables constructed to pick up synergy and scale effects, including the number of other firms exporting the same product in the same destination, or the number of destinations to which the firm ships the same product.

In spite of the noisy data, we find strikingly significant results that, moreover, seem to hold across our sample of four countries. Synergy effects are significant at the 1% level in all four countries, as are scale/experience effects. For a Senegalese exporter, for instance, the 2001 first-year survival probability of 22% would rise by eight percentage points to 30% if the number of national competitors selling the same HS6 product on the same destination market were to double from the baseline 21 (22 including himself) to 42. This is not huge, but it is not negligible either. Moreover, results on a pooled sample including all four countries suggest that the synergies are truly national. We test this by testing the significance of a counterfactual synergy variable counting the number of other firms exporting the same product to the same destination. It is not significant. Thus, it is really the mass of exporters from the same country that does the trick.

Our results help explain a finding highlighted in Easterly, Resheff and Shenkenberg (2009); namely, that national export success often takes the form of 'big hits', with one narrow export item suddenly growing rapidly. If a sufficient number of exporters target one market simultaneously, their chances of surviving are larger, possibly triggering a virtuous cycle of survival and growth (like for example Eaton et al. (2008) we find that export spells that survive tend to grow—for instance, in Senegal, products that entered a market in 2001 and survived till 2008 reached, by then, four times their entry volume). From a normative viewpoint, our results provide a rationale for using public funds to promote national exports abroad. The positive synergy we identify is akin to external economies of scale, as the presence of same country-same product competitors means that each exporter can expect to amortize market entry costs over longer sales runs. However, these economies of scale are unlikely to be sufficiently visible and understood to induce incumbent exporters to provide assistance to entrants (something that is seldom seen in reality), leading to a market failure. Public intervention in the form of export promotion can help overcome that market failure.

The paper is organized as follows: Section 2 presents a few stylized facts using a recent survey of African exporters conducted by the World Bank as part of the African exporter survival project. Section 3 describes the data. Section 4 discusses estimation issues and results, and section 5 concludes.

2 Stylized facts

[this part to be completed by Denisse using the survey.] As part of the project that led to this paper, the World Bank carried out in 2009 a survey of XX past and current African exporters to assess qualitatively the barriers to survival on foreign markets. The survey includes general information on firms, export diversification, expansion plans, and perceived influences on export survival. 301 of the firms covered overlap with our customs data. Networks seem to be critical to the initiation of export transactions. Third-party contacts (through relatives, friends, intermediaries and suppliers) were ranked #1

3 Data

We use raw transaction-level files from customs in the four countries covered. (The World Bank's project initially covered six countries, but two were tossed out for data unreliability or lack of cooperation from national authorities). Each file contains 6-digit HS codes, FOB destination market, shipment value, exporting firm's name, and date (day) of transaction. We used firm names to weed out pure intermediaries, individuals, and NGOs, as we are interested in the survival of exporting firms. Of course, we would have liked to link export data to firm characteristics, but our attempts to match customs files with other files containing firm characteristics stumbled on confidentiality issues or simply lack of firm surveys or utter unreliability of existing ones. Sample periods are 2005-2008 for Malawi, 2005-2008 for Mali, 2000-2008 for Senegal, and 2003-2008 for Tanzania.

Table 1 gives descriptive statistics. Tanzania has the largest number of firms (1'359), followed by Malawi (856), Senegal (715), and mali (280). Of course, all of those firms are, by construction, exporting firms, so the decision to export is outside the paper's scope, and all our results must be understood as conditional on entry to export.

We aggregated transactions to *annual* (firm x destination x HS6 x starting year) quartets, our primary sample unit. Before turning to survival analysis (next section), a few observations can be made. Following the literature on the intensive and extensive margins (e.g. Evenett and Venables 2003 or Brenton and Newfarmer 2007), we group our primary sample units into new firms, new products, new destinations and continuing firm-product-destinations. Items labeled 'new' refer to units that are present in the data at time t but not at time $t-1$.

These groups are designed to be mutually exclusive: If a new firm enters the export markets all the destinations to which it ships all its products are counted in the new firm' category. If an existing firm introduces a product, all destinations of that new product are counted in the 'new product' category. If an existing firm exports an existing product to a new destination, it

is counted in the 'new destination' category. The remaining existing firm-product-destinations comprise the fourth category (of continuing firm product destinations). The total change in the last of category is the intensive margin. Changes in the first three all contribute to the extensive margin.

Figure 1 shows observation counts and aggregate dollar values for the four categories of this decomposition in our four countries. Looking at export values, existing product sold in existing destinations (i.e. observations for which firm, destination and HS6 at time t are all the same as they were at time *t-1*) dominate in dollar value, although not always in count. For example, in Tanzania, continued firm-product-destinations accounted for 90 percent of export value in 2006 but only for 25% of the observation count. This suggests that our countries experiment substantially (consistent with Rodriks 'self-discovery' notion (Rodrik) and with the empirical observations of Cadot, Carrère and Strauss-Kahn (2010) on low-income countries, but on a small scale. Continuing firm product destinations make up a relatively small number of export transactions, but a large share of export values. This confirms findings of Besedes and Prusa (2007) and Brenton and Newfarmer (2007), who also demonstrate the importance of the intensive margin in explaining export growth in developing countries (see also Evenett and Venables 2002).

We also find that a firm's product that manages to survive on a given destination market will grow in volume over time. Conditional on survival, Senegalese firm-product-destinations that appear in 2001 (we don't know the initial year of those appearing in 2000, the sample's initial year, because they are censored) grew by a factor of more than four between 2001 and 2008. Simiarly, Tanzanian firm-product-destinations that appear in 2005 grew by a factor of over three in the sample period (i.e. up to 2008).

Table 2 shows the number of firms, firm-products, and firm-product-destinations by year of entry, and tracks their survival over time for each origin country. Naturally, these numbers go down by attrition. For instance, looking at the Senegal panel, of the 206 firms that entered the export markets in 2001, 84 were alive in 2002, and 21 in 2008.

The third column of that table is derived from the second and shows the survival rate with respect to the previous year over time (i.e. one minus the annual death rate). Survival rates increase over time. For instance, 59 percent of firms that entered in 2001 dropped out until the next year, while 13 percent of firms that survived until 2007 survive also until 2008.

This casual observation is consistent with Besedes and Prusa's decreasing-hazard rate finding (annual death rates are discrete-time approximations to instantaneous hazard rates) although, as noted, this finding must be taken cautiously. Comparing the upper panel (firms) with middle and lower ones (products and product-destinations respectively) shows that there is less stability at more 'disaggregate' levels. These results suggest that there is churning in export

products and destinations *within* firms; in other words, that firms experiment with products and destinations. Thus, Rodrik's self-discovery process holds not only at the national level, but also—quite naturally—at the firm level. This pattern is also consistent with the notion that firms face uncertainty about export costs or demand parameters, a notion that is central to the heterogeneous-firms literature.

The fourth column shows survival rates with respect to the first year. While 90 percent of the firms that entered in 2001 drop out until 2008, 97 percent of firm-products and 97 percent of firm-product-destinations are no longer present.

In all four countries, the exit rate after one year is very high. Low survival rates suggest that not only the study of new entry to export markets is an important determinant of exports, but also that the survival rates of firms plays a crucial role in the determination of sustained export flows, and might be an important angle to improve in order to generate stable export flows. In this paper we focus on the determinants of survival in the first year on export markets, which is the year during which most exit happens.

4 Estimation strategy

After aggregation of transactions to cumulated annual totals, the primary sample remains a panel, as we observe repeated firm x destination x HS6 triplets over several years. However we are interested in survival, so the data needs to undertake a second transformation. Because of the short duration of our panels, we cannot perform survival analysis *stricto sensu*, as this would require more years than we have. Instead, we take advantage of the empirical regularity discussed in the previous section—namely, that the median export spells in Africa lasts only one year exept in Mali—to define survival in a binary form. We define a new (firm x destination x HS6 x initial year) quartet as one that appears for the first time in the database, and say that this quartet 'survives' if it lasts more than one year. The quartet is then associated to a survival dummy (our dependent variable) equal to one. If it lasts only one year, it is associated with a survival dummy equal to zero. If it has already appeared in the sample, we drop it (this concerns only a very small number of observations, since our sample periods are only a few years except for Senegal). Thus, we reduce our panel to a quasi-cross-section, even though each observation has an initial-year tag allowing us to control for calendar time. Doing so allows us to bypass the issue of how long a spell break should be to be considered a 'death', an issue that has been discussed at length in the survival literature and that has no clear-cut answer. Unless indicated otherwise, all our regressions are run country by country (one for Mali, one for Malawi, one for Senegal, and one for Tanzania).

Formally, let v_{fpdt} be the dollar value of exports, by firm f, of product p to destination d in

calendar year t. We ignore exporting-country subscripts since our equation is estimated at the country level. Our dependent variable is

$$s_{fpdt} = \begin{cases} 1 & \text{if } s_{fpdt} > 0, s_{fpd,t-n} = 0, \text{ and } s_{fpd,t+1} > 0 \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

for all $n > 0$, and the estimating equation is

$$\Pr(s_{fpdt} = 1) = \phi\left(\mathbf{X}_{fpdt}\beta + \delta_i + \delta_d + \delta_t + u_{fpdt}\right) \tag{2}$$

where ϕ is the probit or logit function and i indexes industries (HS2). X_{fpdt} is a vector of regressors. It includes measures of the firm's experience with the product and with the destination as well as proxies for agglomeration and market attractiveness. These proxies are counts of (i) n_{ft}, the number of other products exported by firm f; (ii) n_{fdt}, the number of products that firm f exports to the same destination d; (iii) n_{pdt}, the number of firms that export the same product p to the same destination d; and (iv) n_{dt}, the total number of products exported to destination d by all firms from the same country. That is, the notation convention is to omit the index of the dimension over which the count is summed. All counts are put in logs, and all regressions include time fixed effects δ_t, destination fixed effects δ_d, and industry (HS2) fixed effects δ_i. We use robust standard errors clustered at the product-destination level throughout.

This Our second outcome of interest is the log value at which units enter the export markets. The equation we estimate is

$$\ln v_{fpdt} = X_{fpdt}\beta + \delta_f + \delta_d + \delta_t + u_{fpdt} \tag{3}$$

where v_{fpdt} is the value of product p by firm f shipped to destination d at time t in the export spell's initial year.

We estimate 2 by probit (reporting marginal effects) and 3 by OLS. Typically, marginal effects of a probit estimation can be interpreted like OLS coefficient, and also in the present case a robustness check reveals that quantitatively the difference between the results from an OLS and a probit regression are small and in most cases not statistically significant.[4]

[4]Results of a comparison of OLS and Probit estimates are available upon request.

5 Results

Baseline regression results are shown in table 3. The first regressor of interest is $\ln n_{dt}$, the number of national (firm x product) combinations sold on a given destination market. If one Senegalese firm sells two HS6 products in the E.U. and another one sells three, $n_{dt} = 5$ for all five observations with $d =$ E.U. in year t. The effect of this count on survival is negative and significant. Given that we apply destination fixed effects, this variable picks up time-variant destination-country effects, like unusual growth in the markets attractiveness. If demand shocks at the national market/HS6 level follow, over time, a mean-reverting process with low persistence, our finding has a natural interpretation—namely, that exporters enter booming markets and exit them when the boom is over, which our result suggests comes soon.[5] Given that we apply destination fixed effects, this variable picks up time-variant destination-country effects, like unusual growth in the markets attractiveness.

The second variable reported in Table 3, lnn_{pdt}, counts the number of firms selling the same product in the same destination. This picks up synergy or agglomeration effects. We find that the effect is, again, statistically significant. Ignoring the count nature of the variable, we can approximate its quantitative effect by writing the probability of survival as $p_{fpdt} = \Pr(s_{fpdt} = 1)$, so that, using the first column of Table 3,

$$dP_{fpdt} = 0.0792 d \ln n_{pdt} = 0.0792 dfracdn_{pdt} n_{pdt} \tag{4}$$

Using $p_{fpdt} = 0.22$ (from the lower panel of 2) and $n_{pdt} = 22$ as initial values, a doubling of the number of exporters ($dn_{pdt}/n_{pdt} = 1$) gives $dp_{fpdt} = 0.0792$ or about 8 percentage points more in the probability of survival beyond the first year.

Thirdly we measure the experience of a firm with the product by counting the number of destinations that the same firm exports the same product to (lnnr_sf_sp_d). Experience with a product increases the value of first year exports significantly, and also increases the survival probability in all regressions we tested. This shows that firms which have more informations about a certain product make better choices for additional destinations and are more confident about their entry, which is reflected in the higher values with which they enter.

Finally we measure firm experience with a certain destination by counting the number of products that the same firm exports to the same destination (lnnr_sf_p_sd). We find that in Tanzania, Senegal and Malawi such experience increases the survival probability significantly, while in Malawi the effect is not significantly different from zero. The value of first year exports

[5] If we rerun the exercise without destination fixed effects, the coefficient on this variable turns positive in explaining survival, suggesting that *permanently* more attractive markets are associated with longer survival, which is consistent with our interpretation.

is significantly lower in all four countries. Thus experience with a destination gives firms the confidence to export also goods at lower quantities, while the survival probability of these goods is higher. Note that in terms of values experience with a product differs from experience with a destination.

It should be stressed that since all these four effects are present in a single regression, the results are conditional on one another. Further, given the specification, all results must be interpreted conditional on entry to export in the year for which the equation is estimated.

Further we reproduce one stylized fact from the literature in table 6, namely that exports with higher values are more likely to survive the first year. This might reflect exporters that are more confident about their products enter the export markets with higher quantities in the first year, and that confidence is positively correlated with actual survival. In all four of our regressions this is significantly observed, while all other results remain similar in terms of size and significance.

Given the data at hand, we do not have many variables to control for firm heterogeneity. In principle this may effect our results by the inclusion of an omitted variable bias. For this reason we recompute the results and add a firm fixed effect that eliminates heterogeneity on firm level, such as management ability. Table 7 reports these results, and shows that the results described are robust to the inclusion of firm fixed effects, in sign, size and significance.[6]

As a robustness check to these findings, we recompute the table using lagged explaining variables in table 4. While some coefficients vary in their level of significance across these two tables, all coefficients that are significantly differently from zero show the same signs in both tables, and generally the results are quite similar.

A concern is that a large fraction of exports might be from NGOs, international organizations or embassies. Since exports from these institutions are typically not driven by profit motives, they might bias the results. The data for one of the countries considered (Senegal) allows us to distinguish types of exporters, and to recompute the results excluding these international exporters. Table 5 displays this robustness check, and shows that the results hold in a similar way if these exporters are excluded. In terms of observations, these international exporters constitute less than three percent.

We also analyze how the results affect different products differently. First we construct a measure of revealed comparative advantage of product i defined as

[6]For computational purposes in this table the survival columns are not estimated by a marginal-effects probit strategy, but with the help of OLS. Since we found for estimations as in table 3 that the marginal effects for the survival probability estimated by probit do not differ much from OLS we think that this is a valid approximation also here.

$$rca_i = \frac{\frac{x_{ic}}{\sum_i x_{ic}}}{\frac{x_{iw}}{\sum_i x_{iw}}}. \tag{5}$$

In this equation x_{ic} denotes the export of good i of country c and x_{iw} the export of good i of the world. Thus this coefficient measures the ratio of the share of the export of a certain good in a country's total exports to the share of the export of that good in global exports. The higher its value, the more that country is believed to have a comparative advantage for the production of that good. To compute this time invariant measure we use the mean of exports of the years 1999, 2000 and 2001. This variable measures differences of endowments of natural resources and infrastructure that favors the production or export of particular goods. As displayed in table 8, we find some evidence that goods for which a country has a higher revealed comparative advantage have a higher survival probability and enter at higher values to the export markets. The results presented previously do not change once we include this control for comparative advantage. This suggests that the agglomeration and experience effects described go beyond comparative advantage differences and can be more clearly interpreted as information flows.

In table 11 we test if the results are different for homogeneous and heterogeneous products as classified by Rauch (1999).[7] We find that consistently across the four countries the negative impact of market attractiveness on survival is stronger for homogeneous goods. These goods are less differentiable and thus exposed to tougher competition. The agglomeration effect is not consistently stronger across countries for homogeneous or heterogeneous goods. Both experience effects however are stronger for heterogeneous goods, which we believe to be the products that benefit more from better information.

In the literature it has been suggested that firms have core and marginal products, and that firms have a higher comparative advantage in the production of their core products (see for example Iacovone, Rauch and Winters (2010)). To test if this result holds also, we use the variation of firms that enter with several products simultaneously, and compute the share of each of these products within the total value of all entrants. This variable (*prod_share*) must be between zero and one. In the first first four columns of table 12 we repeat our standard estimation. The table suggests that this share is indeed positively correlated with size and survival probability of entrants, which is analogue to the results provided in table 6. However, this effect as in the first four columns could be solely mechanical, since we established that firm-product-destinations with long survival have a high survival probability and also a large value. This pattern emerges also when controlling for size of entry, which highlights the importance of core products also on export markets.

[7] We treat goods classified as reference price goods similar to homogeneous goods.

Another robustness check concerns the "agglomeration effect". We find that this effect disappears when we replace the agglomeration effect with a "placebo agglomeration", which denotes the same measure for each product as the mean or the value from the other three countries (see table 13). Since these effects are positively correlated for products across countries, we control for comparative advantage and firm fixed effects in this table.

Finally, the export data provided by the African customs authorities for each of the African countries studied does not always fit the global imports reported from this country by other sources (Comtrade). Noise may have been introduced for example by the authorities reporting either measure or by different exchange rates used for conversion. In table 9 we repeat the estimation only for those observations, where the sum of export value reported by our destination countries for a product is closer than 10 percent to the value reported by Comtrade. As apparent from the table, while the number of observation shrinks, the interpretation remains similar.

6 Survey

The previous results highlight some determinants of survival of discoveries on export markets. To understand the nature of these effects better and to complement these findings, we use answers from a survey conducted with exporters from the four countries. These are provided in table 10. In each country around 100 firms provided answers to the questions. The questions are designed such that each firm could give multiple answers to each of the questions, hence the answers can sum to more than 100 percent.

The first question investigates how first time exporters made contact with their first client. The answer that dominated largely was that third party contacts such as relatives, friends, intermediaries and suppliers provided most of the contacts. This is consistent with the positive effect from agglomeration that we find in the regression analysis, and might highlight one of the channels through which this effect operates. Overall, the second and third most important answers were research online and trade fairs. The latter could be one of the public goods related to agglomeration. Contacts also emerge through competitors' networks, export promotion agencies, exporters' associations and other channels, but to a lesser degree (with importance to less than a fifth of the first time exporters).

The second question considers firms already exporting, and asked how they looked for buyers in foreign countries. We find again that the leading answer given were third party contacts (such as suppliers, intermediaries, friends, relatives, ...), which played an important role for 70 percent of exporters. Also the other channels were given more importance than in the first questions, with slight differences of ranking. Trade fairs played an importance for 39 percent

of firms, export promotion agencies for 17 percent.

The third question enquirers how buyers who approached exporters themselves established contact. Also here we find that third party contacts play the main role with 70 percent relevance. Trade fairs, and a company website were relevant for 35 and 33 percent of the firms in the sample. Old clients of the company also played an important role with 30 percent of impact. This highlights one effect through which the experience variable might operate. Competitors networks, export promotion agencies and other channels were the least important answers.

The final question asks how the opportunity to export a new product came about in the first place. The most important answer was pointing to existing buyers who approached the company for other products, which highlights the importance of experience for the establishment of new export contacts. The second most important answer was that companies had success with products domestically and thus decided to offer them abroad. 46 percent of companies answered that they saw demand in an existing buyers' market, which again highlights to the importance of experience. Third parties and the imitation of successful competitors played minor roles.

7 Conclusion

We document for the set of African countries studied that these countries experiment a lot on export markets on low scale and with low survival rates, particularly in the first year on export markets. Thus the focus of this paper lies in the analysis of the determinants of the first year survival probability of new entrants to export markets. In addition we study the size at which different products enter.

We find that experience of firms with either a destination or a product increases the survival probability of its new entry experiments greatly. Firms that have experience with a certain destination are able to export low-quantity products with better survival probabilities there, while firms that have experience with a product export higher quantities with increased survival probabilities. Agglomeration – the joint export of a certain good by many different firms to the same destination – also has a positive effect on survival. We present evidence from a survey that in part this agglomeration effect may be due to information gains. Finally we show that booms to certain destinations attract relatively small exports and typically have bad survival rates.

Experience is more helpful for heterogeneous goods, which suggests the importance of information uncertainties. Further, the results are robust to the inclusion of controls of comparative advantage.

Our results suggest that policies have different effects for different types of firms. The political goal to achieve more sustainable export links can be more easily reached in cooperation with experienced exporters (while the experimentation of unexperienced firms might serve to discover new export possibilities). Further we highlight positive spillovers from established exporters on newcomers.

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	Nr firms	Nr prod.	Nr dest.	Nr prod/firm		Nr dest/firm		Nr firms/prod		Nr firms/dest		Value of entry (USD)	
				Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Mali	280	575	99	2.54	2	3.89	2	1.89	1	7.18	2	219,694	5,373
Malawi	856	932	102	1.57	1	4.10	2	3.76	1	13.19	3	106,475	571
Senegal	715	1,653	100	3.10	1	6.76	2	2.92	2	22.17	5	47,111	3,446
Tanzania	1,359	1,689	137	2.49	1	3.62	1	2.91	1	24.69	7	83,078	2,858

Table 1: Descriptive statistics. This table shows for each source country: The number of firms, products, destinations, the number of products per firm, number of destination per firm, number of firms per product, number of firms per destination and the value of those firms that entered the export market. All values are computed for the year 2006.

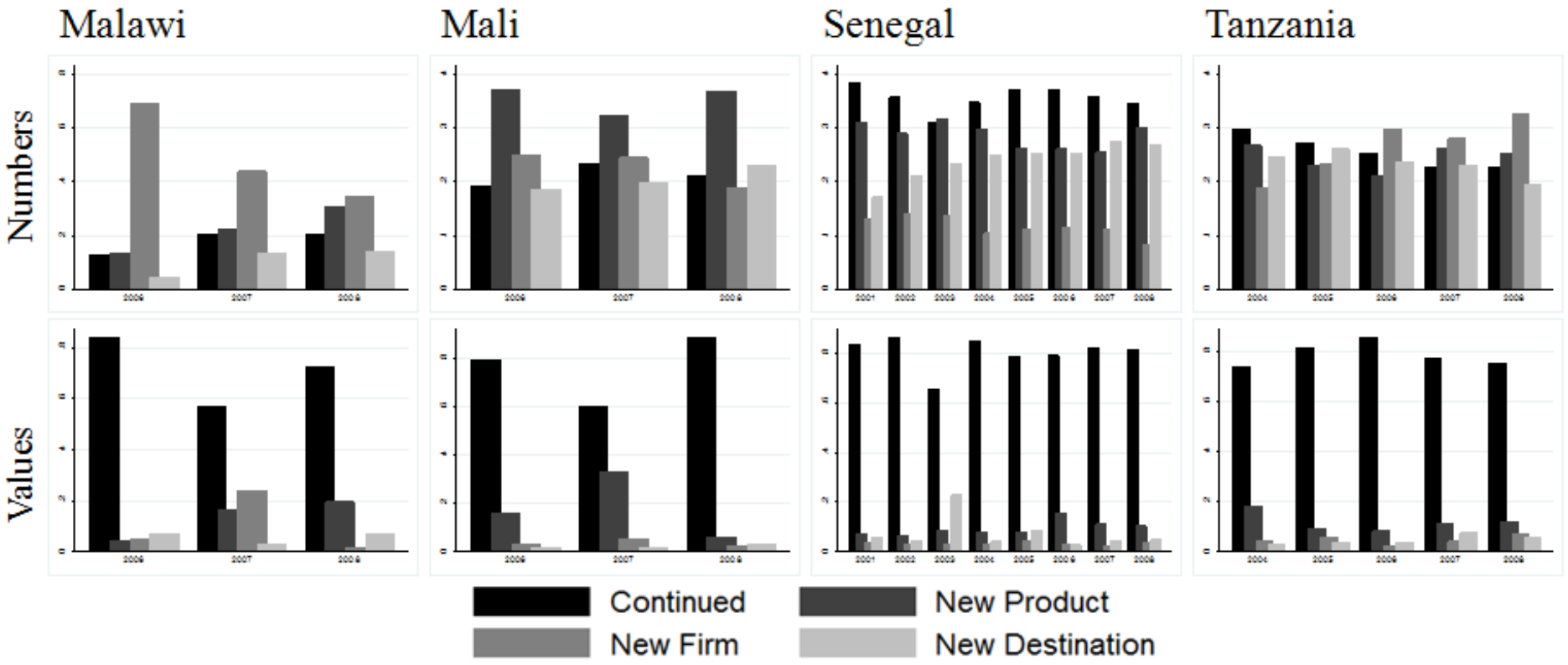

Figure 1: This graph classifies each of the origin-firm-product-destination observations into one of four mutually exclusive groups: *New Destination* includes units of existing firms which export an existing product to a new destination; *New Products* includes existing firms that add a product to their portfolio, *New Firms* includes all units from firms that did not export before, while *Continued* includes all other units. The first set of graphs displays the share of observations, and the second set the share of total values of each category.

	Senegal Entry: 2001			Tanzania Entry: 2004			Mali Entry: 2005			Malawi Entry: 2005		
	Nr	Y-Exit	Exit	Nr	Y-Exit	Exit	Nr	Y-Exit	Exit	Nr	Y-Exit	Exit
Firm												
2001	206											
2002	84	0.59	0.59									
2003	57	0.32	0.72									
2004	40	0.30	0.81	420								
2005	35	0.13	0.83	194	0.54	0.54	273			670		
2006	29	0.17	0.86	118	0.39	0.72	159	0.42	0.42	217	0.68	0.68
2007	24	0.17	0.88	85	0.28	0.80	123	0.23	0.55	154	0.29	0.77
2008	21	0.13	0.90	75	0.12	0.82	103	0.16	0.62	126	0.18	0.81
Product												
2001	2055											
2002	449	0.78	0.78									
2003	192	0.57	0.91									
2004	117	0.39	0.94	2656								
2005	94	0.20	0.95	497	0.81	0.81	1047			3322		
2006	78	0.17	0.96	200	0.60	0.92	305	0.71	0.71	325	0.90	0.90
2007	61	0.22	0.97	106	0.47	0.96	166	0.46	0.84	174	0.46	0.95
2008	54	0.11	0.97	71	0.33	0.97	123	0.26	0.88	127	0.27	0.96
Product destinations												
2001	3326											
2002	718	0.78	0.78									
2003	356	0.50	0.89									
2004	245	0.31	0.93	4908								
2005	167	0.32	0.95	837	0.83	0.83	1391			3828		
2006	129	0.23	0.96	295	0.65	0.94	286	0.79	0.79	509	0.87	0.87
2007	101	0.22	0.97	167	0.43	0.97	122	0.57	0.91	316	0.38	0.92
2008	84	0.17	0.97	113	0.32	0.98	82	0.33	0.94	224	0.29	0.94

Table 2: Survival cohorts. In the columns indexed *Nr* we document for each origin country the number of firms products and destinations for the longest available time series. Column *Y-Exit* shows the exit rate (ie. the share of units that left) with respect to the first year, and column *Exit* the exit rate with respect to the entry year.

Table 3: Effects

	Survival	Value	Survival	Value	Survival	Value	Survival	Value
lnnr_f_p_sd	-0.0347***	-0.238***	-0.0485***	-0.0712	-0.0390**	0.148	-0.116*	0.0529
	(0.00981)	(0.0572)	(0.0128)	(0.0527)	(0.0165)	(0.149)	(0.0612)	(0.256)
lnnr_f_sp_sd	0.0792***	0.219***	0.0731***	0.289***	0.0125***	0.193***	0.108***	0.452***
	(0.00432)	(0.0353)	(0.00459)	(0.0261)	(0.00441)	(0.0451)	(0.0183)	(0.120)
lnnr_sf_sp_d	0.124***	0.686***	0.197***	0.405***	0.102***	1.302***	0.121***	0.547***
	(0.00420)	(0.0277)	(0.00446)	(0.0199)	(0.00912)	(0.102)	(0.0180)	(0.0956)
lnnr_sf_p_sd	0.0165***	-0.387***	0.0469***	-0.467***	0.00316	-0.457***	0.0409***	-0.457***
	(0.00228)	(0.0136)	(0.00271)	(0.0124)	(0.00353)	(0.0382)	(0.0120)	(0.0610)
Observations	20380	20703	27135	27473	4938	5659	1954	2324

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 4: Lagged rhs variables

	Tanzania		Senegal		Malawi		Mali	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Survival	Value	Survival	Value	Survival	Value	Survival	Value
Llnnr_f_p_sd	-0.0517***	-0.183***	-0.0276**	-0.0329	0.00613	-0.0739	0.0647	-0.0643
	(0.00676)	(0.0448)	(0.0123)	(0.0492)	(0.0166)	(0.118)	(0.0417)	(0.210)
Llnnr_f_sp_sd	0.0564***	0.244***	0.0616***	0.327***	0.0127***	0.234***	0.0988***	0.436***
	(0.00488)	(0.0370)	(0.00496)	(0.0271)	(0.00472)	(0.0428)	(0.0221)	(0.125)
Llnnr_sf_sp_d	0.0706***	0.428***	0.143***	0.352***	0.0694***	0.799***	0.171***	0.796***
	(0.00443)	(0.0296)	(0.00505)	(0.0230)	(0.00899)	(0.111)	(0.0228)	(0.124)
Llnnr_sf_p_sd	0.0131***	-0.132***	0.0216***	-0.227***	0.0234***	-0.0569	0.0169	-0.251***
	(0.00222)	(0.0130)	(0.00244)	(0.0116)	(0.00434)	(0.0477)	(0.0130)	(0.0667)
Observations	20380	20703	27135	27473	4938	5659	1954	2324

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 5: Robustness check: NGO

	Including IOs		Excluding IOs	
	(1)	(2)	(3)	(4)
	Survival	Value	Survival	Value
lnnr_f_p_sd	-0.0276**	-0.0329	-0.0249**	-0.0280
	(0.0123)	(0.0492)	(0.0126)	(0.0502)
lnnr_f_sp_sd	0.0616***	0.327***	0.0614***	0.329***
	(0.00496)	(0.0271)	(0.00505)	(0.0274)
lnnr_sf_sp_d	0.143***	0.352***	0.143***	0.380***
	(0.00505)	(0.0230)	(0.00517)	(0.0235)
lnnr_sf_p_sd	0.0216***	-0.227***	0.0218***	-0.229***
	(0.00244)	(0.0116)	(0.00247)	(0.0117)
Observations	27135	27473	26427	26760

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 6: Values

	(1)	(2)	(3)	(4)
	survival	survival	survival	survival
lnnr_f_p_sd	-0.0252***	-0.0456***	-0.0320**	-0.119*
	(0.00946)	(0.0128)	(0.0159)	(0.0609)
lnnr_f_sp_sd	0.0705***	0.0658***	0.00946**	0.0902***
	(0.00412)	(0.00457)	(0.00416)	(0.0179)
lnnr_sf_sp_d	0.101***	0.186***	0.0758***	0.102***
	(0.00414)	(0.00447)	(0.00850)	(0.0179)
lnnr_sf_p_sd	0.0288***	0.0608***	0.0111***	0.0552***
	(0.00225)	(0.00280)	(0.00338)	(0.0123)
ln_value	0.0335***	0.0296***	0.0153***	0.0354***
	(0.00133)	(0.00149)	(0.00161)	(0.00491)
Observations	20380	27135	4938	1954

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 7: Firm fixed effects

	Tanzania		Senegal		Malawi		Mali	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Survival	Value	Survival	Value	Survival	Value	Survival	Value
lnnr_f_p_sd	-0.0407***	-0.240***	-0.0397***	-0.0640	-0.0216	0.386	-0.116**	0.0900
	(0.0114)	(0.0585)	(0.0115)	(0.0537)	(0.0456)	(0.259)	(0.0563)	(0.299)
lnnr_f_sp_sd	0.105***	0.300***	0.0868***	0.321***	0.0398***	0.323***	0.0986***	0.524***
	(0.00527)	(0.0298)	(0.00470)	(0.0254)	(0.00688)	(0.0416)	(0.0227)	(0.135)
lnnr_sf_sp_d	0.126***	0.436***	0.162***	0.346***	0.173***	0.705***	0.106***	0.474***
	(0.00600)	(0.0302)	(0.00546)	(0.0241)	(0.0257)	(0.130)	(0.0236)	(0.123)
lnnr_sf_p_sd	0.0442***	-0.142***	0.0242***	-0.369***	0.0175	-0.638***	0.0516***	-0.207**
	(0.00424)	(0.0253)	(0.00359)	(0.0178)	(0.0167)	(0.116)	(0.0168)	(0.0935)
Constant	0.153**	8.451***	0.623	10.12***	-0.579*	1.530	-0.00567	3.135**
	(0.0706)	(0.604)	(0.432)	(0.267)	(0.302)	(0.934)	(0.269)	(1.314)
Observations	20703	20703	27473	27473	5659	5659	2324	2324

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 8: Revealed comparative advantage

	Tanzania		Senegal		Malawi		Mali	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Survival	Value	Survival	Value	Survival	Value	Survival	Value
lnnr_f_p_sd	-0.0508***	-0.168***	-0.0335**	-0.00609	0.0141	-0.110	0.0282	-0.0906
	(0.00748)	(0.0484)	(0.0133)	(0.0535)	(0.0207)	(0.123)	(0.0545)	(0.243)
lnnr_f_sp_sd	0.0561***	0.213***	0.0664***	0.308***	0.0104*	0.188***	0.0849***	0.542***
	(0.00530)	(0.0378)	(0.00500)	(0.0281)	(0.00583)	(0.0484)	(0.0279)	(0.138)
lnnr_sf_sp_d	0.0710***	0.387***	0.152***	0.405***	0.0692***	0.623***	0.174***	0.618***
	(0.00487)	(0.0312)	(0.00548)	(0.0252)	(0.0101)	(0.109)	(0.0299)	(0.149)
lnnr_sf_p_sd	0.0162***	-0.127***	0.0222***	-0.229***	0.0287***	-0.0710	0.0295*	-0.292***
	(0.00254)	(0.0147)	(0.00261)	(0.0125)	(0.00568)	(0.0584)	(0.0161)	(0.0858)
Comp. adv	0.00371**	0.0749***	0.00132	0.0872***	0.00349*	0.0916***	0.00663	0.101***
	(0.00152)	(0.0104)	(0.00164)	(0.00913)	(0.00192)	(0.0191)	(0.00648)	(0.0351)
Observations	17078	17393	22748	23032	3668	4151	1277	1537

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 9: Robustness: Consistent data only

	Tanzania		Senegal		Malawi		Mali	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	survival	ln_value	survival	ln_value	survival	ln_value	survival	ln_value
lnnr_f_p_sd	-0.0552***	-0.312***	-0.0402**	0.0512	-0.0340	0.0385	0.0634	-0.273
	(0.0134)	(0.0786)	(0.0166)	(0.0663)	(0.0278)	(0.177)	(0.113)	(0.512)
lnnr_f_sp_sd	0.0838***	0.163***	0.0626***	0.220***	0.0101	0.122*	0.128**	0.101
	(0.00534)	(0.0428)	(0.00592)	(0.0331)	(0.00767)	(0.0649)	(0.0614)	(0.307)
lnnr_sf_sp_d	0.121***	0.534***	0.208***	0.416***	0.139***	1.854***	0.0511	0.0682
	(0.00511)	(0.0337)	(0.00541)	(0.0237)	(0.0164)	(0.151)	(0.0430)	(0.218)
lnnr_sf_p_sd	0.00428	-0.475***	0.0423***	-0.490***	-0.00481	-0.493***	0.0415*	-0.438***
	(0.00280)	(0.0169)	(0.00338)	(0.0150)	(0.00585)	(0.0516)	(0.0223)	(0.129)
Observations	13370	13677	17197	17456	2362	3423	479	714

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations. This table only takes into account observations, where total exports from country are no more different than 10 percent from global imports reported by WITS.

Table 10: Survey

Question 1: First time exporters: How was the contact with the first client made?

	MLI	**MWI**	**SEN**	**TZA**	**All**
Research online	14	11	24	35	21
Third party contact[1]	73	68	77	51	67
Competitors' network	8	12	24	11	14
Trade Fair	20	12	19	34	21
Export Promotion Agency	12	11	5	13	10
Exporters' Association	9	7	8	8	8
Another channel	16	24	5	11	14

Question 2: If the company looked for its buyers, how did it approach them?

	MLI	**MWI**	**SEN**	**TZA**	**All**
Research online	26	31	29	41	32
Third party contact[1]	74	72	76	57	70
Competitors' network	19	18	23	21	20
Trade Fair	40	35	28	52	39
Export Promotion Agency	18	19	11	21	17
Exporters' Association	14	5	6	17	11
Another channel	10	20	15	6	13

Question 3: If the buyers approached the company, how did they approach it?

	MLI	**MWI**	**SEN**	**TZA**	**All**
Company's website	22	30	29	53	33
Old clients of the company	25	28	33	32	30
Third-party contact[1]	62	75	75	66	69
Competitors' network	14	28	21	26	22
Trade Fair	34	33	20	55	35
Export Promotion Agency	18	21	7	25	18
Another channel	9	22	15	8	13

Question 4: How did the opportunity to export a new product come about?

	MLI	**MWI**	**SEN**	**TZA**	**All**
An existing buyer approached the company	54	46	50	68	54
The company saw saw demand in a buyers' market	33	46	50	56	46
The company saw successful competitors	17	27	13	32	22
Success with selling the product domestically	38	42	44	68	48
Through a third party[1]	46	23	25	35	32
Any other type of opportunity?	17	19	13	6	14

[1] For example: suppliers, intermediates, friends, relatives, ...

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 11: Rauch classification

	TZA		SEN		MLI		MWI	
	Hom survival	Het survival	Hom survival	Het survival	Hom survival	Het survival	Hom survival	Het survival
lnnr_f_p_sd	-0.208***	-0.176***	-0.183**	-0.0835	0.447	0.267	-0.00330	0.0406
	(0.0543)	(0.0343)	(0.0792)	(0.0544)	(0.309)	(0.269)	(0.202)	(0.223)
lnnr_f_sp_sd	0.247***	0.190***	0.225***	0.218***	0.281**	0.368***	0.204***	0.0901*
	(0.0302)	(0.0317)	(0.0264)	(0.0214)	(0.117)	(0.138)	(0.0764)	(0.0496)
lnnr_sf_sp_d	0.282***	0.347***	0.393***	0.565***	0.361**	0.822***	0.484***	0.894***
	(0.0271)	(0.0278)	(0.0292)	(0.0228)	(0.146)	(0.131)	(0.0908)	(0.173)
lnnr_sf_p_sd	0.0404***	0.0589***	0.0511***	0.0836***	-0.0887	0.124**	0.0655	0.221***
	(0.0145)	(0.0118)	(0.0169)	(0.00965)	(0.0864)	(0.0603)	(0.0735)	(0.0391)
Constant	0.0479	-0.499	0.358	0.543	1.184	-0.121	-0.145	0.183
	(1.043)	(0.758)	(0.634)	(0.607)	(1.009)	(1.294)	(1.389)	(1.463)
Observations	6716	10934	7045	17238	568	967	826	3262

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 12: Core products

	TZA	SEN	MWI	MLI	TZA	SEN	MWI	MLI
lnnr_f_p_sd	-0.0342***	-0.0529***	-0.0392**	-0.124**	-0.0257***	-0.0485***	-0.0321**	-0.122**
	(0.00960)	(0.0128)	(0.0164)	(0.0598)	(0.00936)	(0.0128)	(0.0159)	(0.0603)
lnnr_f_sp_sd	0.0720***	0.0708***	0.0111**	0.0977***	0.0671***	0.0654***	0.00913**	0.0874***
	(0.00421)	(0.00455)	(0.00437)	(0.0180)	(0.00410)	(0.00456)	(0.00416)	(0.0180)
lnnr_sf_sp_d	0.118***	0.193***	0.0994***	0.111***	0.0992***	0.185***	0.0755***	0.0999***
	(0.00418)	(0.00445)	(0.00909)	(0.0180)	(0.00414)	(0.00447)	(0.00852)	(0.0179)
lnnr_sf_p_sd	0.0363***	0.0661***	0.0120***	0.0881***	0.0391***	0.0701***	0.0136***	0.0813***
	(0.00265)	(0.00308)	(0.00457)	(0.0144)	(0.00259)	(0.00309)	(0.00421)	(0.0143)
prod_share	0.132***	0.143***	0.0380***	0.209***	0.0751***	0.0813***	0.0113	0.130***
	(0.00923)	(0.0107)	(0.0135)	(0.0339)	(0.00924)	(0.0114)	(0.0127)	(0.0359)
ln_value					0.0310***	0.0260***	0.0150***	0.0281***
					(0.00135)	(0.00158)	(0.00164)	(0.00514)
Observations	20380	27135	4938	1954	20380	27135	4938	1954

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.

Table 13: Placebo agglomeration exercise

	(1) TZA	(2) SEN	(3) MWI	(4) MLI
	survival	survival	survival	survival
lnnr_f_p_sd	-0.0360**	-0.0290	-0.0390	-0.158**
	(0.0156)	(0.0252)	(0.0531)	(0.0705)
lnnr_f_sp_sd_other	0.0135	-0.00254	0.0263	0.0459
	(0.0100)	(0.0121)	(0.0178)	(0.0327)
lnnr_sf_sp_d	0.132***	0.138***	0.163***	0.0988***
	(0.00875)	(0.00902)	(0.0318)	(0.0337)
lnnr_sf_p_sd	0.0446***	0.0179***	0.0239	0.0640***
	(0.00614)	(0.00602)	(0.0215)	(0.0229)
comp_adv	0.00112	0.00835***	0.00339	0.0119*
	(0.00194)	(0.00239)	(0.00235)	(0.00696)
Observations	12440	10436	4001	1484

Note: Year, destination and industry (HS-2) fixed effects used. Robust standard errors are clustered on the level of product-destinations.