Export Destinations and Firm Heterogeneity: Evidence from Botswana's Manufacturing Firms

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Abstract

This study combines two strands of literature, being firm heterogeneity and bilateral trade flows determination to provide insights into firm characteristics during selection into export destinations. Using firm-level data capturing export transactions and firm characteristics of Botswana's manufacturing firms, the study provides evidence on the productive impact of destination export diversification using the Zero-inflated Poisson regression model. A striking result that less productive firms are most likely to enter the export markets is obtained, a factor likely to be largely driven by the heavy reliance of Botswana's manufactured exports on the SACU market. Once firms are already exporting, more productive firms, particularly those exporting out of the SACU region are likely to be multi-destination exporters. The study further provides evidence that foreign-owned, large and older firms are those that are more likely to enter the export markets. However, once the firms are already exporters, firm size and exporting experience matter for geographic export diversification.

1. Introduction and Background

In the wake of a decline in the cost of transportation and telecommunications across countries, policymakers (in both developing and developed countries) have encouraged domestic firms to expand their export destinations, with the anticipation that diversification of export sales can improve the terms of trade, lower volatility and boost economic growth (Shepherd, 2010; Xuefeng et al, 2016). Recent studies such as Eaton et al. (2008) and Xuefeng et al. (2016) that focus on diversification of export destinations suggest that an analysis of export market diversification at the firm or sector level, rather than country level, can be more informative for understanding whether export market expansion is effective and how policies may influence it. For example, Eaton et al. (2008); Xuefeng et al. 2016 showed that there is high entry of Colombian exporters into the export markets, but most of these entrants have a very small export share and exit the market within a year. Some firms, however, succeed in these markets and gradually break into other export destinations, thereby becoming multi-destination exporters. Hence, understanding the dynamics of introducing new export destinations at the firm level constitutes the first step in understanding how a country can upgrade its export structure and what policies, if any, can stimulate this process (Iacovone and Javorcik (2010)). To this end, the question of whether and to what extent firm characteristics drive geographic market expansion or export sales diversification remains relevant and crucial. Notwithstanding this, our understanding of how to diversify geographically[1] still remains limited in developing countries.

From the existing literature, firms use neighbouring countries as stepping stones to learn about and improve their foreign market capabilities. If these firms succeed in these markets, they then begin to test their capabilities in larger and more advanced countries (Xuefeng et al. 2016). This market expansion can initially erode the economies of scale achieved through the firms' foreign market involvement as this involves incurring production and transaction costs associated with advertising, legal representation as well as development of an agent/distributer network (Seyoum, 2014). This implies that it is not every firm that will be able to accomplish geographic market expansion. Understanding the type of firms that drives geographic export diversification is therefore an important developmental concern. As it is, empirical literature shows vast heterogeneity in terms of firm destination export diversification (Eaton et al., 2004). The stylized fact coming from empirical literature is that the majority of exporting firms export to a single export destination while only a small fraction of firms export to multiple export destinations. Evidence also points to multi-product multi-destination exporters as being different and thus account for disproportionate share of export value relative to single product single destination exporters.

In light of the above, with this study we seek to provide insights into firm characteristics during selection into export destinations. Specifically, we seek to answer the following questions:

- How distributed are Botswana firms' export destinations?

[1] In this chapter, geographic export diversification is defined as the presence in different export destinations at a given level of export value.

- Do more productive firms export to multiple export destinations?
- Do more productive firms transition into multiple export destinations?

Botswana is an interesting case study for the analysis of the productive impact of the number of export destinations at the firm-level. Firstly, destination export diversification has been identified as a policy priority of the Government of Botswana since the earlier National Development Plans (NDPs). Secondly, Botswana's manufactured exports remain concentrated in the Southern African Customs Union (SACU) region, making the country prone to regional shocks. Over the period 2003 – 2012, of the total Botswana's manufactured exports, about 67% were destined to the SACU region[2]. The urgency of the need of Botswana's export manufacturers to consider exporting outside the SACU region is further induced by the volatile diamond and SACU revenues accruing to the country[3]. Thirdly, the country's manufacturing sector is plagued by low levels of productivity (Habiyaremye, A, 2013).

This study contributes to the existing literature on geographic export diversification in the following ways: Firstly, it adds to the productivity-exporting literature by incorporating the role of trade integration and hence show that for countries that rely heavily on a trade bloc for its exports, the link between firm productivity and export destinations is dependent upon whether firms export outside the trading bloc or not. To the best of our knowledge, no other study has analysed determinants of geographic export diversification in an African context in the manner that we are proposing. Secondly, by combining two strands of literature being firm heterogeneity as well as bilateral trade flows, we add to the methodological contribution by using the Zero-inflated Poisson regression model, an estimation method that accounts for the excess zeros in the bilateral trade flows as well as over-dispersion.

We use a unique dataset comprising firm characteristics and export transactions to provide evidence that less productive firms are most likely to enter the export markets. This is a striking result that we believe is largely driven by the heavy reliance on the SACU market by Botswana manufacturing exporters. The results further show that once firms are exporting, more productive firms, especially those that export out of the SACU region are more likely to be multi-destination exporters. Related to other firm characteristics, the study provides evidence that foreign-owned, large and older firms are most likely to enter the export markets. However, once the firms are already exporters, firm size and exporting experience (in years) matter for geographic export diversification. These results have important policy implications and thus call for the development of market access strategies as well as tailor-made industrial and tax policies that address inefficiencies that hinder the success of firms in export markets, with a view to encouraging firms to export outside the SACU region.

The chapter is structured as follows. Section 2 reviews existing literature and related evidence on the relationship between firm productivity and number of export destinations. Then the

[2] During the same period, South Africa was the predominant export destination, taking 61% of Botswana's manufactured exports. Hence, the big challenge is to reduce dependency on the South African market.

[3] SACU revenues are shared across member countries based on the countries' imports and GDP levels. Given the current projections of low GDP growth in South Africa, SACU receipts are expected to decline in the subsequent years (IMF, 2017).

theoretical model of firm-based geographic export diversification and the description of data used in the analysis follows in Section 3. Section 4 presents the results on profile of Botswana's manufacturing sector as well as empirical results while Section 5 concludes, drawing some policy implications.

2. Literature Review

2.1 Theoretical Background

The question of whether more productive firms export to multiple export destinations, and whether the productivity effect is accentuated when exporting outside a dominant trade bloc is anchored on the recent literature on firm heterogeneity and international trade based on work by Melitz (2003). This literature argues that only the more productive firms will find it profitable to export, which suggests that the sunk costs associated with foreign market entry can only be met by larger and more productive firms. According to Wagner (2007), these sunk costs relate to distribution or marketing, additional workers to man foreign networks, etc. It is on that basis that Helpman, et al. (2004) argue that the least productive firms will serve only the domestic market, while the more efficient firms will export. The implication of the preceding discussion is that highly productive firms self-select themselves into exporting and this is what has brought birth to the self-selection hypothesis[4].

Interestingly, the theoretical models that unite heterogeneous firms with the determination of bilateral trade flows came into existence in 2008 and they are all based on the Melitz (2003). The leading models have been introduced by Chaney (2008), Helpman et al. (2008) and Melitz and Ottaviano (2008). These models are well-suited for the present chapter that mainly focusses on the determinants of diversification in export destinations. Melitz and Ottaviano (2008) were the first to develop a model that unites heterogeneous firms with the determination of bilateral trade flows at the firm-level. They developed a monopolistically competitive model of trade with firm heterogeneity that encompasses productivity differences amongst firms as well as endogenous differences in market characteristics. This model can further be extended to an open-economy with multiple countries. The model predicts that trade forces the least productive firms to exit and reallocates market shares towards more productive exporting firms. The model however, departs from the Melitz (2003) model by providing a link between bilateral trade liberalization and reductions in mark-ups, thereby signifying the potential pro-competitive effects invariably associated with episodes of trade liberalization.

The main contribution of this model is that it integrates the welfare effects emanating from both the multilateral and unilateral liberalization into a single, unified framework, while simultaneously incorporating the important selection and reallocation effects among heterogeneous firms that were previously emphasized. However, its drawback is that it requires the assumption of an outside good.

Helpman, et al. (2008) develop a model of international trade with heterogeneous firms that predicts positive as well as zero trade flows between countries. In this model, which is in line

[4] The self-selection hypothesis is explained by a positive and significant link between lagged productivity and export status.

with Melitz (2003), firms face both fixed and variable costs of exporting. Firms therefore vary by productivity, and only the more productive firms find it profitable to export. By extension, the profitability of exports is higher for exports to countries with higher demand levels and lower variable and fixed costs. This model further generates a gravity equation. Although this theoretical model has firm heterogeneity, firm-level data is not needed to estimate the gravity equation as sufficient statistics that predict the selection of heterogeneous firms into export markets and their associated aggregate trade volumes could be computed from aggregate data. This therefore is the main drawback of this model, as the availability of firm-level data presents the researcher an opportunity to directly decompose trade data into the intensive margin and extensive margin, leading to a better understanding of firm-level characteristics that influence diversification in export destinations. Although the assumption of bounded support for the productivity shocks gives the researcher more flexibility in estimating empirically the probability that exporters enter a given foreign market, this also has the drawback of preventing the researcher from deriving precise predictions for the role of variable and fixed costs in explaining both the intensive and extensive margins of trade. The model's contribution, however, is that it explicitly models variable export costs.

Finally, Chaney (2008)'s model that is favourable to our study is also premised on firm heterogeneity in a general equilibrium model of international trade. The model assumes the world comprising of many asymmetric countries, separated by asymmetric trade barriers, which is then used to study the strategic choice of firms to export or not, and if they export, which countries to target. The advantage of this model is that it precisely predicts the structure of bilateral trade flows such that the researcher can be able to tell which firm from which country is able to enter a given market. Additionally, by implication, explaining how this particular firm is affected by competition from local and other foreign firms, even in the presence of asymmetric bilateral trade barriers. As such, the model predicts that as firm sizes are magnified, fixed costs have a lesser impact on exports in that large firms can easily overcome the fixed costs of exporting.

In conclusion, the synthesis of this section is that the preceding theoretical models underpinning the link between firm productivity and export destinations have important implications in modelling firm export decisions. Two important insights have been identified as avenues for the successful matching of these models to firm-level data. The first insight involves the accounting of zero trade flows inherent in bilateral trade flows, while the second insight mainly focuses on the appropriate estimation methods to address the zero trade flows. The zero bilateral trade flows might contain important information about the firms, for example, why the firm-destination pairs are not trading together and this information should be accounted for in the form of a theoretically-consistent estimation strategy.

2.2 Related Empirical Literature

Following the conception of theoretical models that unite heterogeneous firms' literature with the determination of bilateral trade flows literature in 2008, a number of empirical studies in developed countries subsequently followed to examine firm heterogeneity and the geography of international trade. Amidst the fact that geographic export diversification is a sustainable means to the realization of export diversification, empirical studies, especially with a focus on geographic export diversification, are still limited due to the unavailability of datasets that have both firm characteristics and bilateral trade flows in developing countries. The beauty of these datasets is that they unpack the export market which has hitherto been treated as a single entity[5], ignoring the fact that firms can export to multiple export destinations at the same time (Lawless 2010). Eaton et al. (2008) give evidence on Colombian exporters into the export markets, suggesting that there is high entry of Columbian exporters into the export markets, pointing to the fact that most of these entrants have a very small export share and exit the export market within a year. Some firms, however, succeed in the various export markets and gradually break into other export destinations (Xuefeng et al. 2016). Therefore, investigating more about what firm characteristics motivate individual firms to diversify their exports across destinations deserves particular attention.

Notwithstanding the importance of understanding the types of firms that export to multiple destinations, empirical literature in this research is still confined to developed countries. For developed countries, the studies include Eaton et al. (2004) for French firms; Lawless (2009; 2010) for Irish firms; Damijan et al. (2007) for Slovenian firms; Love et al. (2016) for UK firms; Andersson et al. (2008) for Sweden firms and Xuefeng et al. (2016) for Chinese firms. Recent studies for developing countries include: Rodríguez-Pose et al. (2013) for the Indonesian firms. Even with this study, the focus was on export propensity and intensity rather than geographic export diversification.

The empirical findings on the link between firm productivity and geographic export diversification fall mainly into 3 issues. Firstly, there is the issue of definition/measurement of geographic export diversification. Several studies have used export intensity (or foreign sales over total sales) and geographic export diversification interchangeably (Contractor et al., 2007; Rodríguez-Pose et al. (2013)). We concur with Verbeke and Brugman (2009) and Boehe et al. (2016), in that doing so can be misleading. This emanates from the fact that two firms with the same export intensity can show entirely different degrees of geographic export diversification in terms of the number of countries or regions covered. In this chapter, we define geographic export diversification as the number of export destinations per firm.

Secondly, estimation methods vary across the relevant studies ranging from the probit or logit regression models to sample selection regression models such as Heckman regression model. It is until recently that the estimation methods used have extended to count data models such as standard Poisson models and zero-inflated regression models to take into consideration the high proportion of non-exporters in the datasets.

[5] See for example, work from Roberts and Tybout 1997; and Bernard and Jensen (2004).

Thirdly, the control variables constituting the firm characteristics that influence firm labour productivity have been identified from theoretical and empirical literature and these variables have been found to have mixed effects on geographic export diversification[6]. Studies such as Roberts and Tybout (1997); Alvarez and Lopez (2005) and Lawless (2010) have identified these variables to include, *inter alia*, firm age, capital stock, ownership status of the firm, previous exporting experience, firm size and lagged investment. Although the importance of firm heterogeneity on firms' export decisions has been reaffirmed by these studies, the results remain entirely country-specific. While theoretically, we expect exporting experience of the firm to positively influence geographic export diversification (by virtue of its picking the international engagement of the firm), empirical literature regarding exporting experience of a firm on geographic export diversification remains ambiguous. This is mainly due to data limitations which usually use firm age and exporting experience interchangeably (Love et. al. 2016). D'Angelo et al. (2013) argue that some studies use firm age as a proxy for the length of firms' exporting experience. It is imperative therefore to differentiate between firm age and exporting experience so as to tease out the differential effects of these two variables thereby ironing out some of the ambiguity in the empirical literature. After controlling for export status, Lawless (2010) found that larger firms are most likely to export to more export destinations. This is largely attributable to the fact that large foreign firms in export sectors are more productive than domestic owned firms as was established for South African manufacturing firms by Edwards (2004) and for the US manufacturing firms (Bernard et al. 2003). The preceding discussion suggests that the empirical results are dependent upon the types of firms being investigated in a certain country as well as data structure. The following is thus a snapshot of findings from the empirical literature:

Empirical analysis relating to the geographic coverage of a firm's exports has been carried out by Eaton et al. (2004) using French data for 1986. They find great heterogeneity in firms' export participation underpinning a stylized fact. In particular, they find that the majority of exporting firms export to a single export market and only a small fraction of firms export to a large number of export markets[7]. Understanding the types of firms that are multi-destination exporters is thus of paramount importance.

Consistent with previous studies (Eckel and Neary (2010); Lawless, 2009; Mayer et al. 2014), Xuefeng et al. (2016) found that firms exporting to multiple markets have higher productivity levels and growth rates. Additionally, some studies found the relationship between firm geographic export diversification and productivity to be non-linear (Xuefeng et al. 2016), implying that the productive impact of export diversification depends on meeting a particular firm productivity threshold. This further implies that the minimum threshold of export markets that needs to be satisfied by firms before export market diversification could translate into positive spillovers in firm productivity varies amongst countries, underscoring the importance of this chapter. The limitation of the above-stated empirical studies is that

[6] It is evident from the extant literature that geographic export diversification is regarded as an independent strategic choice, suggesting that geographic export diversification is an exogenous driver of firm performance. However, foreign market entry decisions may be a function of firm capabilities, suggesting that geographic export diversification may be endogenous (Shaver, 1998).

[7] Similar finding have been found by Andersson et al. (2008) and Xuefeng et al. (2016).

although they discuss the link between firm productivity and number of export destinations, the studies do not explicitly consider exporting out of a predominant customs/trade bloc as a potential channel to enhance the productivity effect. The few exceptions are the Andersson et al. (2008) and Lawless (2009) using the Swedish and Irish data, respectively, who have attempted to deal with this issue although implicitly.

Lastly, the above literature can therefore be synthesized in the following ways. Firstly, it is noteworthy that there is extant research in both theoretical and empirical work on the link between firm productivity and number of export destinations, particularly for developed countries. However, this kind of research is also of particular importance to Africa, where most countries are still struggling with continued export concentration in terms of both products and destinations. The chapter therefore contributes to the academic literature in three different ways. Firstly, it adds to the productivity-exporting literature by incorporating the role of trade integration and hence show that for countries that rely heavily on a trade bloc for its exports, the link between firm productivity and export destinations is dependent upon whether firms export outside the trading bloc or not. To the best of our knowledge, no other study has analysed determinants of geographic export diversification in an African country context, in the manner we are proposing. Secondly, because of the two strands of literature that are combined in this chapter, we add to the methodological contribution by using an estimation method that accounts for the structure of the trade data. Thirdly, we contribute to the academic literature by adding to the recent literature focussing on unpacking the export market which has hitherto been regarded as a single entity, overlooking the fact that firms can export to multiple export destinations at the same time.

3. Methodological Framework

3.1 Modelling Firm-Based Geographic Export Diversification

The theoretical foundations informing the analysis of the determinants of export diversification in destinations at the firm level is inspired by the gravity model of heterogeneous firms, which captures bilateral trade flows at the firm level. According to this theory, heterogeneity in firm behaviour is as a result of the fixed costs of entry which are market specific and higher for international markets than for the domestic market (Chaney 2008; Melitz 2003). The implication of this result is that only the most productive firms are able to cover these fixed costs. By and large, firm productivity is correlated with a large array of other observable firm characteristics.

It should be emphasized that introducing firm heterogeneity in models of international trade ensures that not all firms in a country export and that not all products are exported to all destinations. Furthermore, this means that not all countries in the rest of the world are necessarily served. To this end, by virtue of considering asymmetric countries which are divided by asymmetric trade barriers, Chaney (2008) model analyses the strategic choice of firms to export or not, and if they export, which countries to target. This model therefore best predicts the structure of bilateral trade flows. In view of this, we adopt the theoretical framework developed by Chaney (2008) by incorporating firm heterogeneity in productivity and fixed costs of exporting. In this framework, Chaney (2008) developed a model of steady-state trade flows between many countries, based on the assumption that productivity shocks

are pareto distributed, hence providing a theoretical model of firm selection into export markets. Export earnings in different export destinations vary by capability (characteristics) level of each exporting firm and each firm follows an export marketing strategy that maximizes its profit. Following the Chaney (2008) model of heterogeneous firms exporting to multiple countries, we assume that a firm located in *i* and indexed by its unitary productivity level α, exports the following value to country *n*:

$$x_{ni}(\alpha) = \left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} (\alpha w_i \tau_{ni})^{1-\sigma} \frac{X_n}{\Phi_n} \qquad (1)$$

Equation (1) shows that exports are a function of workers' productivity (w_i), the bilateral trade costs (τ_{ni}) and destination country characteristics $\frac{X_n}{\Phi_n}$. The intensive margin (that is, firm's decision to export to a destination) is captured by $(1-\sigma)$. A firm's export earnings are not observed for all export destinations, but only for the single destination in which the firm exports to. Additionally, it is assumed that when firm *i* decides not to export to any of the export destinations, the export earnings are zero. To this end, this model predicts that in view of productivity cut-off differentials across export markets, the higher productivity firms will export to most export markets. These productivity cut-off differentials also imply that firms will enter exporting markets in an orderly manner. The model further predicts a positive link between a firm's export sales and number of export markets, suggesting that multi-destination exporters will contribute more to export value (Chaney, 2008).

On the basis of this analytical framework, we motivate the empirical model that we estimate to establish the determinants of export diversification in destinations. An estimable presentation of the firm-level gravity model in logarithm takes the form of equation (2). Thus, taking logs of equation (1), dropping the source country index[8] and adding a time dimension to capture the panel structure of our dataset as well as a properly behaved error term, yields the following equation[9]:

$$\ln x_{nt}(\alpha) = (1-\sigma)\ln\left(\frac{\sigma}{\sigma-1}\right) + (1-\sigma)\ln(\alpha_t w_t) + (1-\sigma)\ln \tau_{nt} + \ln\left(\frac{X_{nt}}{\Phi_{nt}}\right) + \varepsilon_{nt}(\alpha) \qquad (2)$$

In particular, we identify 2 sources of identification for $(1-\sigma)$, that is, the intensive margin; one from the cost component of the firm $(\alpha_t w_t)$ and the other from international price shifters (τ_{nt}). This implies that firm characteristics as well as destination characteristics are important factors influencing export destination decisions at the firm-level. But because the focus of this chapter is on geographic export diversification, we extend this model, by focussing the dependent variable to capture number of export destinations served by a firm in a given year, such that the dependent variable takes values 0, 1, 2, 3, etc. This study

[8] We drop the source country index because we are only dealing with one country, that is, Botswana.

[9] Zero trade flows emanating from the structure of data that we have cannot be treated with logarithmic specification. Hence, the specification has to be estimated appropriately econometrically.

therefore tests the hypothesis that more productive firms export to multiple export destinations. In particular, more productive firms exporting out of the SACU region export to multiple destinations.

To obtain an empirical model explaining the firm labour productivity impact of geographic export diversification, we replace the dependent variable in equation (2) with a count variable, assuming that firm productivity (and in particular exporting out of the SACU region) will directly influence the number of export destinations (Chaney, 2008). Literature on firm heterogeneity argues that the more productive firms are more likely to export and to export to multiple export destinations as they are most likely to be able to cover the fixed costs of exporting (Melitz, 2003). Due to a large number of zeros in the dependent variable emanating from the fact that many firm-year observations are zeros, a Zero-Inflated Poisson regression model is estimated to establish this relationship. What remains a fact is that not all these zeros represent domestic manufacturers. Part of these zeros captures exporting firms that did not export in a given year. Hence, with the Zero-inflated Poisson regression model, we are able to analyse the determinants of export destination decisions utilizing firm-level information and also taking into cognizance the fact that not all firms export in every given year and that those that do export do not export to all destinations in the world. Hence, with this empirical methodology we are able to assess why a firm decides to export or not in a given year, and if it exports why it chooses this particular number of export destinations and not the other one (this being captured by the number of export destinations a firm exports to in our context). To this end, the ultimate estimable presentation of the firm-specific productivity impact of geographic export diversification outside the SACU region takes two stages being the non-exporting decision (which corrects for the large number of zeros) as well as the second step of deciding market coverage. As in Lawless (2010), the market coverage equation follows a Poisson distribution and is as estimated as:

$$M_{it}^{*} = \beta_0 + \beta_1 LP_{i,t-1} + \beta_2 Out\_of\_SACU + \beta_3 LP_{i,t-1} * Out\_of\_SACU + \beta_4 X_{it} + v_{it} \quad (3)$$

With

$$M_{it} = M_{it}^{*} \text{ if } Y_{it} = 1 \quad (4)$$

$$M_{it} = 0 \text{ if } Y_{it} = 0 \quad (5)$$

Where Y_{it} is the export status of firm i and the observed market coverage is zero if the firm is not an exporter. In the event the firm is an exporter, its market coverage will be determined by equation (3) where $LP_{i,t-1}$, Out_of_SACU dummy and $LP_{i,t-1} * Out\_of\_SACU$ are one period lag of firm labour productivity (proxied by one period lag of log turnover per worker

and log investment per worker)[10], a dummy variable capturing 1 for firms that export out of the SACU dummy and an interaction term between labour productivity and Out of SACU dummy, respectively. The matrix X_{it} captures other determinants of market coverage that have empirically been found to influence export destinations decisions of a firm[11] and these include ownership status of a firm, age (years), size, exporting experience (years), turnover and investment[12].

3.2 Data and Data Overview

i) Data Description

To undertake this study, we integrated two sources of firm-level data obtained from the Botswana Unified Revenue Services (BURS) and Department of Industrial Affairs. The primary data source is the firm characteristics from licensed manufacturing firms from the Department of Industrial Affairs. Present in this dataset are firm characteristics such as labour productivity, age, investment, turnover, number of employees and ownership status. This data covers the years 2003 to 2012 and includes all manufacturing firms that have been granted industrial licenses by the Department, subject to prior formal registration in Botswana as per the Registration of Business Names Act. The law in Botswana requires that all manufacturing firms must possess industrial licenses to enable them to manufacture or sell manufactured products (Government of Botswana, 2008). In order to compile this database, the Department of Industrial Affairs which is mandated to develop and review policies, programmes and strategies aimed at diversifying the economy and stimulating local entrepreneurship, liaises with the various Councils in the country to ensure that the database includes all registered manufacturing firms in the country. This suggests that the database is representative of the manufacturing sector in the country. Furthermore, our dataset is better-suited for our study as existing empirical studies of this nature rely on a sample of large firms as geographic export diversification seems to be more common among large firms (Boehe et al. 2016; Bernard, Jensen, & Schott, 2009; Mayer and Ottaviano, 2007).

Using a concordance file that we developed (details of which are provided in the Appendix section), we then merged in the transaction export data provided by the Botswana Unified Revenue Services (BURS). The transaction database includes very detailed information on firm-level export transactions, including value, quantity, volume and destination at the 8-digit level of the Harmonized System (HS) over the period 2003 to 2012. The transactions dataset is used to identify manufacturing firms that export, as well as the value, range of products and scope of destinations an exporting firm deals with. The merged dataset[13] comprises of

[10] From the Melitz (2003) theory, productivity is potentially endogenous. In light of this, we use one period lag of log turnover per worker (log investment per worker) as a proxy for productivity.

[11] All these variables are in our dataset.

[12] It is worthwhile to indicate that as a first step in establishing this relationship, a baseline specification is considered where the dependent variable does not take into consideration the non-exporting firms and as such the dependent variable is coded 1 if a firm exports to at least one export destination, and 0 if it exports to a single destination. The baseline specification is a logit approach given that the dependent variable is an indicator.

[13] The merged data provide firm characteristics and export information required to estimate our specifications.

the licensed manufacturers, of which we are able to categorize firms into domestic manufacturers as well as exporting manufacturers.

Table 1 below gives a snapshot of the merged dataset, and indicates that our sample covers an average of 297 firm observations in each year between 2003 and 2012. While the total number of manufacturing firms has reduced over time, particularly during the onset and subsequent to the global financial crisis, the share of exporters has on average increased from 52.7% in 2003 to 61.3% in 2012. Although to a large extent, exporting has been viewed as a rare event in existing empirical literature, these statistics are in accordance to what has been found in emerging economies such as Slovenia[14] (de Loecker 2007; Lawless 2009). For example, Lawless (2009) established that in their sample of 751 Irish Manufacturing firms, 83% were exporters. Just like in Sweden, Botswana has a small domestic market, coupled with sharing a border with SACU countries (that share many characteristics with Botswana), which presupposes that Botswana firms face low entry costs to a number of adjacent countries in the SACU region and hence explain relatively high participation rates in international markets (Anderson et al. 2008).

Table 1: The Number of Exporting Manufacturing Firms per year

Year	BURS manufactured goods exporters	Domestic producers	Exporters	Total Manufacturing Firms in our merged dataset	Share of exporters in our merged dataset (%)	Share of exporters in BURS manufactured goods dataset (%)
2003	1597	150	167	317	52.7	10.5
2004	1564	150	165	315	52.4	10.5
2005	1745	161	171	332	51.5	9.8
2006	1768	159	187	346	54.0	10.6
2007	1744	175	202	377	53.6	11.6
2008	1789	178	186	364	51.1	10.4
2009	1823	128	133	261	51.0	7.3
2010	1858	55	91	146	62.3	4.9
2011	1954	162	159	321	49.5	8.1
2012	1944	74	117	191	61.3	6.0
Total	**17786**	**1392**	**1578**	**2970**		

Source: Author's elaboration from the merged dataset.

Note: In the BURS dataset, the manufacturing firms are identified through ISIC Rev 3.

Regarding the representativeness of this dataset, it is worth noting that although the dataset includes only about 20% of manufacturing firms in terms of number of firms as per the Statistical Business Register of Botswana (as well as an average of 9% of the total entities exporting manufactured goods in the BURS dataset), the dataset cover about 54% of manufacturing firms that do exporting, and about 54% of the total value of manufacturing exports (Appendix, Table 2a). These results therefore substantiate that the

[14] The registration process conducted by the Department of Industrial Affairs targets large industrial manufacturers. This largely explains why the sample of manufacturing firms kept by the Department of Industrial Affairs comprises of a high proportion of exporters.

representativeness of the dataset is quite satisfactory[15], given that the focus of this study is on export destinations.

Relating to the data limitations per se, it is noteworthy to indicate that it is difficult to identify mergers and acquisition activities in the dataset that could potentially lead to the disappearance of some firms. This therefore suggests that the exit rates may be over-represented as missing values are not necessarily solely due to firms exiting export markets but could be due to reasons unrelated to export performance. Table 2b (in column 3) in the Appendix provides details of firms that are appearing in the BURS dataset but are non-existent in our merged dataset. There are two possibilities to explain these firms; either these firms represent mergers and acquisitions that have not been accounted for in the export transactions dataset (BURS) or these are firms that may not have complied with the Department of Industrial Affairs to renew their industrial licenses in a given year[16]. We have ignored these firms in our analysis as it basically means they defaulted from renewing their industrial licenses with the Department of Industrial Affairs, yet were still operational.

4. Results and Discussion
   i) Profile of Botswana's Manufacturing Sector

Before we can explore the firm characteristics that influence export destination choices in Botswana, we first need to understand the structure (profile) of the manufacturing sector in general (inclusive of domestic manufacturers and exporting manufacturers). This is viewed in terms of characteristics such as firm ownership distribution, size distribution as well as domestic manufacturers versus exporting manufacturers. We explore the structure of the manufacturing sector in the period between 2003 and 2012. The distribution of Botswana's manufacturing firms by firm size and different ownership categories for the period between 2003 and 2012 is presented in Table 2. The results indicate that there exists heterogeneity in terms of firm ownership status and size. Interesting results are evident. Firstly, within the citizen-owned firms, there is a high likelihood that these firms will be small firms (39.34%). These results further suggest that domestic ownership (citizen-owned firms) is inversely related to the size of the firm. This implies that as firm size increases, firms are highly likely to be joint ventures or foreign-owned. We can therefore surmise that foreign-owned firms dominate the manufacturing sector in this sample and that foreign ownership is positively related to the size of the firm. This is evidenced by the fact that within the foreign-owned firms, the majority of these firms (50.11%) has at least 100 employees[17].

[15] According to the Statistical Business Register (BSR) held by Statistics Botswana, there are 1313 operating establishments in the manufacturing sector. More details on the representativeness of the dataset could be found in the Appendix section.

[16] Our preceding analysis has ignored these firms as insightful results are obtained even without these firms and we believe we are not missing anything by excluding them.

[17] From the merged dataset, out of the 2954 firms, 1342, 1169 and 443 firms are small, medium and large firms, respectively.

Table 2: Distribution of Firms by Firm Size and Ownership Categories (2003-2012)

	Firm Size		
	Small	**Medium**	**Large**
Citizen-owned firms	39.34	33.36	26.19
Joint venture firms	19.45	27.12	23.70
Foreign-owned firms	41.21	39.52	50.11
Total	**100%**	**100%**	**100%**

Source: Author's calculations using the Botswana Customs Trade Statistics and the Annual Survey of Industrial Firms from Botswana Industrial Affairs.

Note: Firm size categorization is as per the Botswana Trade Act (size of Enterprises) order, 2011. The firm size categorization is as follows: Small firms (1 - 24 workers); Medium firms (25 - 100 workers); and Large firms (100+ workers).

Table 3 depicts the distribution of firms by firm ownership status split in terms of domestic manufacturers and exporting manufacturers. On average, between 2003 and 2012, the Botswana manufacturing exporters were dominated by foreign-owned firms (43.75%). Unpacking this, Table 3 also shows that exporters are more likely to be foreign-owned firms or joint ventures (67.66%) than citizen-owned firms (32.34%).

Table 3: Distribution of Firms by Firm Ownership and Trading Status (2003-2012)

	Domestic Manufacturers	**Exporting Manufacturers**
Citizen-owned firms	38.06	32.34
Joint venture firms	22.30	23.91
Foreign-owned Firms	39.64	43.75
Total	**100%**	**100%**

Source: Author's calculations using the Botswana Customs Trade Statistics and the Annual Survey of Industrial Firms from Botswana Industrial Affairs.

The distribution of firms by firm size and trading status category as depicted by Table 4 reveals that exporters in the manufacturing sector are more likely to be medium-sized firms or large firms (66.05%) than small firms (33.95%). In contrast, domestic manufacturers are more likely to be small-sized firms (58.51%) than being medium or large firms (41.49%).

Table 4: Distribution of Firms by Firm Size and Trading Status (2003-2012)

	Domestic Manufacturers	**Exporting Manufacturers**
Small	58.51	33.95
Medium	34.97	43.65
Large	6.52	22.40
Total	**100%**	**100%**

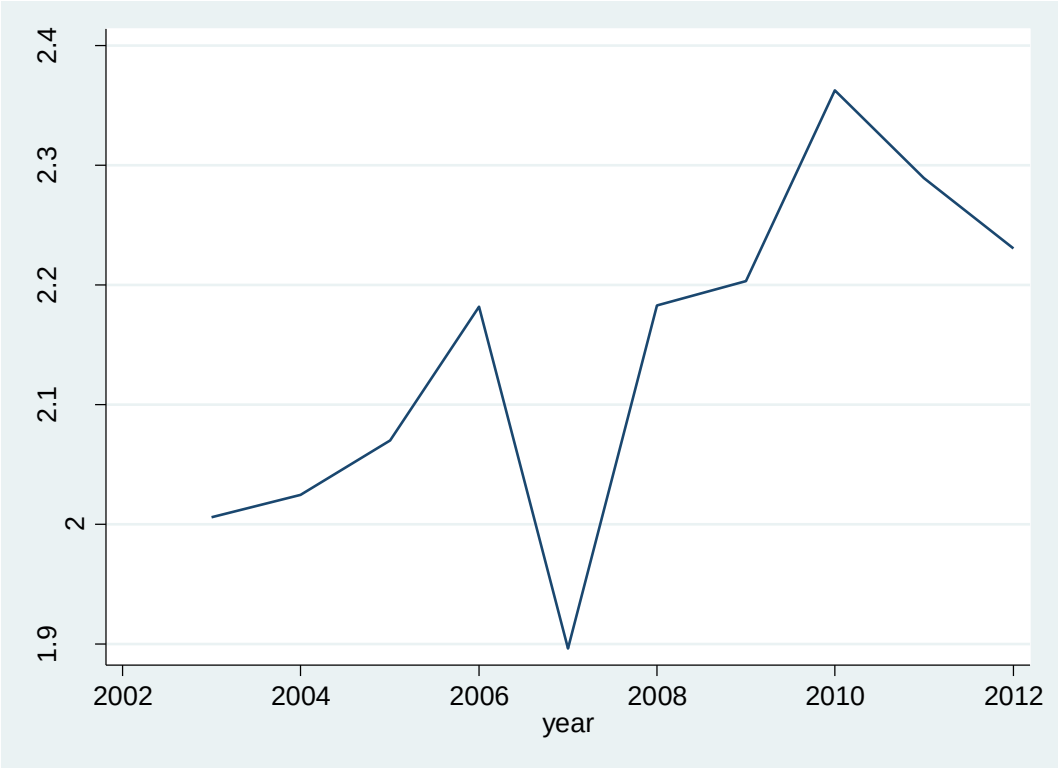
Source: Author's calculations using the Botswana Customs Trade Statistics and the Annual Survey of Industrial Firms from Botswana Industrial Affairs.

Note: Firm size categorization is as per the Botswana Trade Act (size of Enterprises) order, 2011. The firm size categorization is as follows: Small firms (1 - 24 workers); Medium firms (25 - 100 workers); and Large firms (100+ workers).

ii) Exporter Heterogeneity

This section starts off first by discussing background evidence on exporter heterogeneity vis-à-vis export destinations before proceeding to discuss empirical results on how firm characteristics influence export destination choices. The background analysis on exporter heterogeneity on export destinations is based on a two-pronged approach, namely the macro approach as well as at the micro approach. We first start by exploring exporter heterogeneity at the macro-level by plotting average number of export destinations per firm over the period between 2003 and 2012. The results are shown in Figure 1 below. What is evident from Figure 1, is a pattern marked by ups and downs movements, but in general a rise, except for 2007, suggesting the presence of potential destination churning.

Figure 1: Average Number of Export destinations per firm over time (2003-2012)



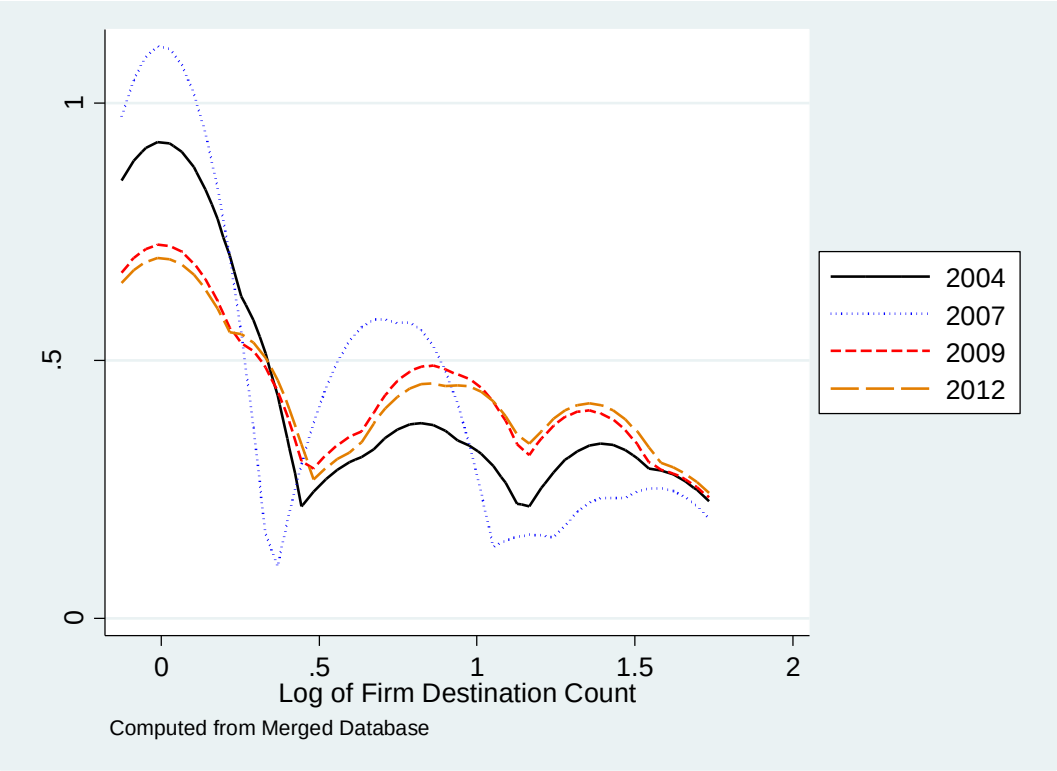
Source: Author's elaboration from the merged dataset.

Note: m_dest_count refers to mean destination count per firm.

We explore this further by unpacking this at the micro-level, as shown by Figure 2 which depicts kernel density distributions of the log number of export destinations per firm for the years 2004, 2007, 2009 and 2012. While the pattern of the distribution has remained the same over the years, Figure 2 suggests a lot of destination churning to have taken place over the years, as evidenced by the concurrent upward and downward movements in the distributions. These results may also point to the possibility that the distribution of the log number of export destinations per firm may not be driven by a normal distribution. As a

general feature, Figure 2 suggests potential firm heterogeneity pertaining to the log number of export destinations per firm characterized by simultaneous entry and exit out of export markets. These results substantiate the findings observed in Figure 1 above and are also in line with what has been obtained by Lawless (2010) who found out that in Ireland exporting firms' involvement in international markets is dynamic in nature characterized by over one-third of the firms changing their export destinations (either by entering or exiting one additional export destination).

Figure 2: Distributions of log number of export destinations per firm (2004-2012)



Further evidence pertaining to destination churning is provided in the Appendix section (Table 5), which illustrates the distribution of firms across export destinations and their average exit and entry patterns in these destinations, over time. Over the period 2003 to 2012, Botswana's manufacturing firms have had exporting relationships with 56 destinations, on average, inclusive of countries from Africa (21 countries), Europe (14 countries), Asia (10 countries), the Americas (4 countries) and Middle East (4 countries) as well as Oceania (3 countries). 61.26% of Botswana's manufactured exports are destined to South Africa, giving evidence that South Africa remains the predominant export destination for Botswana's manufacturing exporters, given its proximity.

Table 3 (Appendix) offers two main insights: First, it suggests that although firms are able to break into the export markets, some are not efficient enough to survive. It is only in a few exceptions that the number of entrants is greater than the number of exiters, pointing to an increase in the net number of exporters. A case in point is for countries such as South Africa, China, Lesotho, Malawi, Namibia, Zimbabwe, Democratic Republic of Congo and Germany. Second, the top 10 export destinations account for 93% of the total exports in the sample,

suggesting that exports are highly concentrated in these top ten trade partners. These findings substantiate the importance of exploring the determinants of firm-based geographic export diversification for Botswana's manufacturing firms.

Next, we provide the background evidence of exporter heterogeneity on export destinations with regard to firm ownership status between the period 2003 and 2012. The results as shown in Table 6 below indicate that multi-destination exporters, that is, exporters exporting to more than one destination are highly likely to be foreign-owned or joint-ventures than citizen-owned firms. Looking within firms, for example, about 53% of the citizen-owned firms export to only one export destination, while 47% export to more than one export destination. These statistics also show that joint-venture firms and foreign-owned firms export to relatively more export destinations than firms with domestic ownership. While 47% of citizen-owned exporters are multi-destination exporters, more than half of the joint-venture (52%) and foreign-owned (54%) firms are multi-destination exporters. These results substantiate the earlier findings on Table 3 that exporters are more likely to be foreign-owned firms or joint-ventures than citizen-owned firms.

Table 6: Distribution of export market diversification of firms with different ownership categories (2003- 2012)

	Number of export markets	**Number of exporting firms**	**Firm-specific percentage (%)**
Citizen-owned firms	1	271	53.14
	2-4	184	36.08
	>=5	55	10.78
Joint venture firms	1	180	47.75
	2-4	138	36.60
	>=5	59	15.65
Foreign-owned firms	1	315	45.65
	2-4	279	40.43
	>=5	96	13.91

Source: Author's calculations using the Botswana Customs Trade Statistics and the Annual Survey of Industrial Firms from Botswana Industrial Affairs.

Similarly, firm heterogeneity in respect to export market coverage is also evidenced among small, medium and large-sized firms as illustrated in Table 7. The results as depicted below are in sync with results already established in Table 4. Small firms are more likely to be single destination exporters while multi-destination exporters are more likely to be medium-sized firms or large firms than small firms. Hence, firm size is positively related to geographic export

diversification. Within the firm, Table 7 below shows that about 25% of large firms export to a single destination, while 75% of them are multi-destination exporters. Furthermore, while only about 35% of small firms are multi-destination exporters, about 52% and 75% of medium-sized and large firms, respectively, are multi-destination exporters. To some extent, these results are in sync with the extant literature on this area which has also established exporter heterogeneity in terms of geographic export diversification (for example, Xuefeng et.al 2016), mainly because small firms are likely to lack the internal resources, thus inhibiting these firms to penetrate geographically and culturally distant markets (Love et. al 2016).

Table 7: Distribution of export market diversification of firms with different sizes (2003- 2012)

	Number of export markets	**Number of exporting firms**	**Firm-specific percentage (%)**
Small firms	1	350	65.42
(1-24 workers)	2-4	151	28.22
	>=5	34	6.36
Medium firms	1	328	47.67
(25-100 workers)	2-4	280	40.70
	>=5	80	11.63
Large firms	1	87	24.65
(100+ workers)	2-4	170	48.16
	>=5	96	27.20

Source: Author's calculations using the Botswana Customs Trade Statistics and the Annual Survey of Industrial Firms from Botswana Industrial Affairs.

Note: Firm size categorization is as per the Botswana Trade Act (size of Enterprises) order, 2011.

While 89.67% of the firms in our sample export to Africa, thus making Africa, the predominant export destination, we unpack this by analysing the within region patterns. We categorize regions into Africa, Europe, Asia and Rest of World[18]. Table 8 thus shows that manufactured exports destined to Africa are largely done by single destination exporters (53%) while a stark contrast is depicted by the remaining regions. The bulk of firms that export to Europe (96%), Asia (90%) and the Rest of the World (75%) are multi-destination exporters. These results suggest that whilst exporting firms are inclined to choose the closest region (Africa), the bulk of these firms are single-destination exporters. The remaining regions thus look promising to enhance the geographic export diversity of the manufacturing firms. However, it seems firms start experimenting in Africa before trying these other export regions.

[18] Rest of World category includes countries in the Americas and Oceania while countries in the Middle East form part of Asia.

Table 8: Distribution of export market diversification of firms with different regions (2003-2012)

	Number of export markets	Number of exporting firms	Firm-specific percentage (%)
Africa only	1	751	53.07
	2-4	510	36.04
	>=5	154	10.88
Europe only	1	3	4.00
	2-4	43	57.33
	>=5	29	38.67
Asia only	1	6	10.00
	2-4	35	58.33
	>=5	19	31.67
Rest of World	1	7	25.00
	2-4	13	46.43
	>=5	8	28.57

Source: Author's calculations using the Botswana Customs Trade Statistics and the Annual Survey of Industrial Firms from Botswana Industrial Affairs.

iii) Empirical Results: Zero-inflated adjusted Destination Choice Model

The results in this section are based on the Zero-inflated Poisson regression model given that there are a large number of zeros in the dependent variable emanating from the fact that many firm-year observations are zeros. However, we first present descriptive statistics of the key variables used in the empirical estimations, which are displayed in Tables 8 and 9 as well as Figure 3 before presenting empirical results on the productive impact of geographic export diversification in Table 10. It is important to assess upfront whether there are any significant heterogeneities between single destination exporters and multi-destination exporters, before we could proceed to the empirical estimation. To do this we follow Xuefeng et al. (2016) and Lawless (2009). A comparison of firms that export to higher number of export destinations relative to those that export to few export destinations as depicted in Table 8 confirms a performance premia in all firm characteristics for firms that export to multiple export destinations. These results are in accordance to our expectation and to the extant empirical literature (Lawless (2009); Xuefeng et al. (2016). At any point in time, multi-destination exporters are larger, more productive, and younger and have many years of exporting experience relative to single destination exporters. Additionally, contrary to existing empirical literature where the firm age variable is invariably negative and

insignificant, for Botswana's case, the firm age variable is positive and significant, suggesting that these firms are dynamic, young and mostly growing rapidly (Falk and Hagsten, 2015)[19].

[19] Details about exporter premia, reflecting differences between exporters and non-exporters can be viewed in the Appendix (Table 6). The results generally point to the fact that exporters are positively different from non-exporters in terms of firm characteristics. We followed the approach used by Bernard and Jensen (1999) to estimate the regressions.

Table 8: Multi-Destination Exporter Premia (2007- 2012)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Investment	Turnover	Employment	Age	Investment/Worker	Turnover/Worker	Exporting Experience
Ln No. Markets	0.875***	0.818***	0.615***	2.238***	0.256***	0.203**	1.002***
	(0.087)	(0.102)	(0.058)	(0.595)	(0.075)	(0.083)	(0.103)
Industry control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	16.493***	13.868***	3.083***	2.000	13.404***	10.843***	2.327***
	(0.205)	(0.215)	(0.127)	(.)	(0.178)	(0.188)	(0.235)
Observations	879	845	885	823	879	845	886
R-squared	0.307	0.294	0.327	0.177	0.231	0.225	0.181

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: 1) Values are given in natural logarithms, except for firm age and exporting experience.

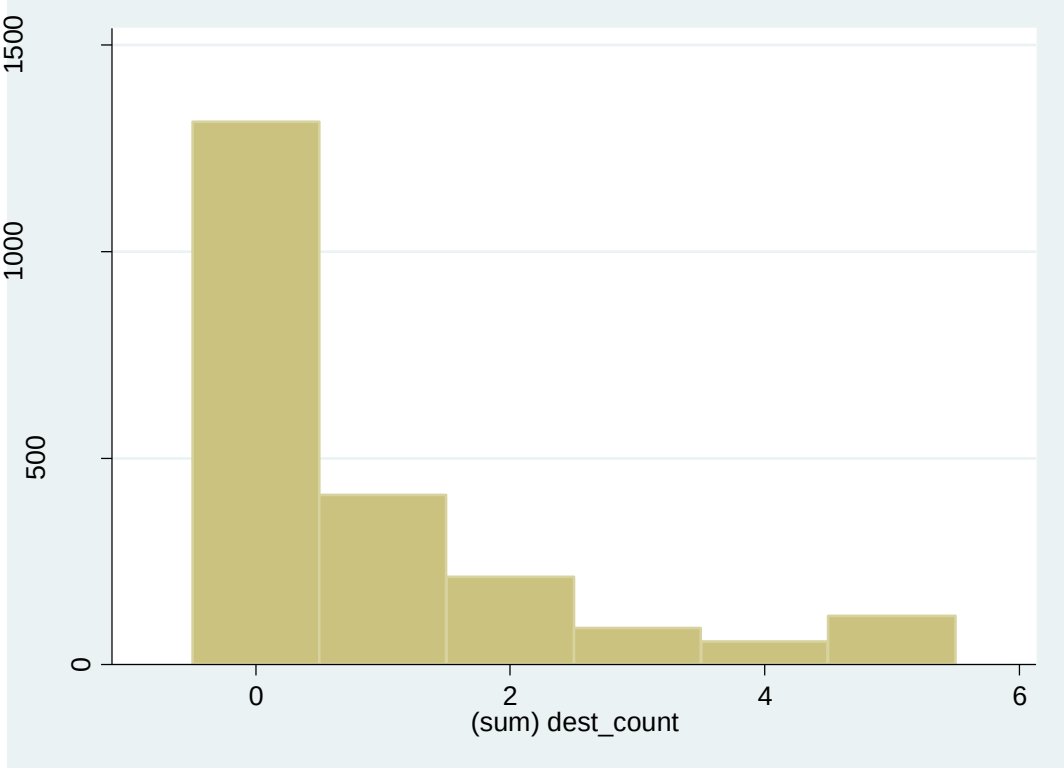
2) Robust standard errors clustered at the firm level.

3) Data pooled over the period 2007 – 2012.

Source: Author's calculation using the merged dataset.

Figure 3 plots frequencies of counts of destinations. Striking in the Figure is the high proportion of firms that report zero number of destinations. Out of the 2202 firms, 1314 (60%) of these report zero number of destinations. These statistics present first-hand evidence justifying that the use of probit or logit models may not be appropriate given the potential biased results emanating from the correlation of the error term with the explanatory variables (De Benedictis and Salvatici 2011).

Figure 3: Destination Counts Frequencies



Note: The last bar of the histogram represents destinations that are 5 or more.

It is important to explore how, over time, firms are transitioning into the different states defined in terms of number of export destinations before we can proceed to the empirical analysis. Table 9 therefore provides some insights into the variation of number of destinations over time via the aid of transition probabilities. The Table portrays evidence of considerable persistence particularly in the zero category as well as the five or more export destinations category. 74% of firms with zero number of export destinations in the previous year also have zero number of export destinations the current year. About 33% of firms with five or more export destinations in the previous year will have the same export destinations in the current year. Hence, the results suggest that once a firm is in the zero category it will remain difficult for it to engage in bilateral trade in the future. This finding on persistence in the export process was also found by Lawless (2009) – that firms seldom change their status as exporters or non-exporters.

Table 9: Year to Year Transitions in number of export destinations

		t						
		0	**1**	**2**	**3**	**4**	**5+**	**Total**
t-1	**0**	73.78	15.23	5.36	1.50	1.69	2.44	100
	1	61.00	24.23	9.75	1.95	1.39	1.67	100
	2	43.62	19.68	18.62	7.98	3.72	6.38	100
	3	31.51	10.96	19.18	16.44	6.85	15.07	100
	4	29.17	14.58	10.42	16.67	12.50	16.67	100
	5+	25.24	2.91	10.68	17.48	10.68	33.01	100
	Total	62.62	16.57	8.56	4.14	2.83	5.29	100

The descriptive analysis above seems to suggest that there is productivity premia (proxied by log turnover per worker) between multi-destination and single destination exporters. Although this is in line with theoretical expectations, further empirical investigation is performed to confirm this. The empirical estimation of this chapter follows a two-pronged approach. As a first step to testing the underlying hypothesis that more productive firms are more likely to be multi-destination exporters, we estimate the baseline model using the logit model, strictly focussing on exporting firms and ignoring non-exporting firms. These results are shown in column 1 of Table 10. In column (1) geographic export diversification is defined by a dummy variable coded one if a firm exports to more than one export destination and zero otherwise. Labour productivity is proxied by a one period lag of log turnover per worker. The coefficient on the measure of labour productivity takes an unexpected negative sign and is insignificant. This is a striking result that seems to suggest that firm productivity does not have a role on the determination of the number of export destinations served by a firm, but rather less productive firms enter the export markets. This result does not make intuitive sense and it contradicts theoretical predictions of firm heterogeneity models (Melitz, 2003). On the other hand, although insignificant, domestic ownership has the expected negative sign. Other control variables with theoretically expected signs are firm size (proxied by number of employees employed by a firm) and firm exporting experience (in years) as calculated by the (difference between the last year and the first year the firm exported) +1 with positive impacts on number of export destinations. These results make intuitive sense and are in accordance with findings of earlier empirical studies such as Lawless (2010) and Love et. al. (2016).

Given the potential shortcoming of the logit model estimation attributed to its inability to conform to the process that generates the trade data, we next proceed to consider both exporting and non-exporting firms as geographic export diversification can be characterized as an event of rare occurrence that could be better depicted by a Poisson distribution rather than a normal or logistical distribution. Additionally, unlike the baseline approach estimated using the logit model where no attempt was made to distinguish amongst multi-destination exporters, we address this shortcoming by employing count data models, where the dependent variable is the number of export destinations served by a firm in a given year, starting from 0,1,2,3, etc. The advantage of this approach is that it considers both exporting

and non-exporting firms. Columns 2 - 7 of Table 10 provide results for the count data models estimated and we will specifically focus on the results of the Zero-inflated Poisson regression model (columns 4 - 7), which is estimated using equation (3)[20]. This largely because of the high proportion of zero number of export destinations (see Figure 3) and that trade data, particularly in the context of geographic export diversification (that is, number of export destinations) is produced in a discrete and countable manner.

The regression results in columns 4 – 5 encompass the two-stage procedure of the Zero-inflated Poisson regression model, where column 5 is the first stage that corrects for the large number of zeros (non-exporters). We first present results in column 5. The results reveal a surprising evidence that less productive firms are most likely to enter the export markets, which is contradictory to theoretical expectations. This surprising result is likely to be driven by the fact that the majority of manufacturing firms in Botswana export to the SACU region. The results as depicted by the control variables are in line with theoretical expectations in that foreign-owned, large and older firms are those that are most likely to export. Just like for the Irish case, this confirms that older traditional firms are heavily reliant on a neighbouring country such as South Africa as an export market, a feature suggesting that neighbouring countries are stepping stones to the realization of export growth and diversity[21] (Lawless 2010).

The destination count regression is depicted in column (4). It is interesting to note that when we take into consideration the selection effect that address the large number of zeros in the dependent variable, the coefficient of lag productivity takes the expected positive sign, although insignificant suggesting that labour productivity does not have any statistical effect in the determination of number of export destinations. This is counterintuitive. Just like the Indonesian manufacturing firms (Rodríguez-Pose 2013), this may suggest that the manufactured exports of Botswana are largely low-technology in nature. The control variables that take expected signs and are also significant are domestic ownership, firm size and exporting experience. The results show that citizen-owned firms tend to have the least number of export destinations, justifying the earlier finding that domestic ownership is inversely related to geographic export diversification. In addition, large and highly experienced firms tend to export to more export destinations.

One potential problem arising from the baseline Zero-Inflated Poisson Model in columns (4) and (5) could be because we have lumped destinations together and ignored the fact that Botswana manufacturing firms rely heavily on the SACU market. This to a large extent, may tend to loosely suggest that firms that export to SACU need not be as productive as firms that export outside SACU. We extend the baseline model by including as explanatory variables the Out_of_SACU dummy (which is coded one if a firm exports outside the SACU region, and zero if it exports to the SACU region) as well as interaction term between lag productivity and Out_of_SACU dummy. The results on the non-exporting logit model (in column 7) remains

[20] The reasoning being the significant over-dispersion test (see Table 5 in the Appendix) and the positive and significant vuong test statistic of 19.49 suggesting that the Zero-inflated Poisson model is favoured relative to the standard Poisson model.

[21] Evidence from literature suggests that exporting to a superior neighbouring country is a stepping stone to accessing more developed export markets and in turn, the enhancement of export diversity (Cebeci et al. 2012).

the same as those depicted in the logit model in column 5. Interestingly, once the firms have entered the export markets, results on the destination count regression show that it is firm size and exporting experience that matters in the determination of the number of export destinations. Although the lag productivity variable and the interacted term remains positive and insignificant, the out of SACU dummy is positive and significant, thereby signifying that exporters that export outside SACU are different from those ones that export to the SACU region. At the same time, the insignificant and positive coefficient of the interacted term tends to suggest that there is no difference in productivity between firms exporting out of SACU and those that do. These results may largely be driven by tax policies as tax policy support tends to shift resources to less productive firms. Botswana is no exception to countries that support small firms through tax incentives in an effort to induce employment creation, firm entry as well as export diversification. This explains why relatively less productive firms will enter the export markets and also export without renewing their industrial licences with the Department of Industrial Affairs. This suggests that for firms in this study, there exists selection specific to each export market which is in line with the finding that low productive firms are inclined to export markets with low productivity thresholds. The same result was obtained for the Swedish firms (Andersson et al. 2008).

In light of the striking result of labour productivity and the interacted term not being significant, as per theoretical underpinnings, we explored this further by taking a test that determines if the two variables are jointly significant. The test returned a p-value of 0.043, confirming that the two variables are jointly significant. This suggests that more productive firms and in particular those that export out of SACU are more likely to be multi-destination exporters. This therefore tend to imply that the overall positive impact of productivity on number of export destinations is higher for firms that export out of the SACU region, thereby supporting the underlying hypothesis of this study. We conclude, therefore, that the study provides evidence that more productive firms transition into multiple export destinations.

As a robustness check across the different specifications estimated in this Chapter, log turnover per worker is replaced with log investment per worker[22]. The same consistent results are revealed as before, with the exception that in the baseline model (column 1), domestic ownership is now negatively related to the number of export destinations served by a firm (see Table 4 in the Appendix). Interestingly, when lag productivity is now proxied by investment per worker, productivity now positively determines the number of export destinations served by a firm (columns 4 and 5). Similarly, lag productivity and the interacted term between lag productivity and out of SACU dummy are jointly significant at a p-value of 0.036. These results are consistent with what was obtained in Table 8 on multi-destination exporter premia.

[22] The use of log investment per worker as a proxy for firm labour productivity is inspired by the fact that in investigating major drivers of manufacturing sector productivity growth of selected Southern African Development Community (SADC) member countries, Chikabwi et al. (2017) found that capital investment positively influenced manufacturing sector productivity growth.

Table 10: Empirical Results of the Determinants of Geographic Export Diversification (2007-2012)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Zero-Inflated Poisson Model (Baseline)		Zero-Inflated Poisson Model (Extended)	
VARIABLES	Logit Model	Poisson Model	Negative Binomial Model	Destination Count	Non-exporting Logit	Destination Count	Non-exporting Logit
Lag productivity	-0.098	-0.004	-0.004	0.005	0.152***	0.003	0.124***
	(0.085)	(0.004)	(0.005)	(0.003)	(0.012)	(0.004)	(0.012)
Citizen_owned_dummy	-0.529	0.951***	0.962***	-0.114*	-52.103***	-0.079	-44.598***
	(0.334)	(0.190)	(0.192)	(0.061)	(1.008)	(0.057)	(1.008)
Joint_venture_dummy	-0.465	0.510***	0.511***	-0.061	-33.740***	-0.055	-29.007***
	(0.325)	(0.188)	(0.150)	(0.074)	(1.488)	(0.065)	(1.488)
Log number of employees	0.511***	0.830***	0.829***	0.156***	-45.559***	0.133***	-38.749***
	(0.140)	(0.081)	(0.047)	(0.026)	(0.634)	(0.022)	(0.626)
Exporting experience (years)	0.410***			0.066***		0.064***	
	(0.097)			(0.016)		(0.015)	
Age (years)		0.079***	0.080***		-2.380***		-2.034***
		(0.015)	(0.015)		(0.137)		(0.137)
Out_of_SACU dummy						0.322***	
						(0.063)	
Lag productivity*Out_of_SACU						0.006	
						(0.006)	
Constant	-1.806		0.643	-0.092	27.790***	-0.106	24.035***
	(1.314)		(1.629)	(0.090)	(0.079)	(0.079)	(0.076)
Industry control	Yes	No	No	No	No	No	No
Year control	Yes	No	No	No	No	No	No
Observations	380	2,202	2,202	2,202		2,202	2,202
Zero Observations		1314	1314	1314		1314	
Vuong test (z)				19.49		19.96	
AIC		1683.916	1685.477	2862.113		2813.164	
BIC		1712.402	1719.659	2930.479		2892.924	
Number of unique_id	167	367	367				

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

This study presents the first evidence in the context of Botswana on firm characteristics that influence export destination choice(s). Specifically, the study has explored the question of whether more productive firms export to multiple export destinations and whether these firms transition into multiple export destinations. The study is based on a dataset that combines manufacturing firm characteristics with export transaction-level data. We find evidence suggesting the following stylized facts. Firstly, that domestic ownership is inversely related to firm size, implying that as firm size increases, firms are highly likely to be joint-venture firms or foreign-owned firms. In this regard, we found evidence that exporters (especially multi-destination exporters) are more likely to be foreign-owned and joint-venture firms than citizen-owned. Secondly, exporters in the manufacturing sector (particularly multi-destination exporters) seem to be more likely to be medium-sized firms or large firms than being small firms. As a general feature, firm heterogeneity pertaining to the log number of export destinations per firm is evidenced, suggesting that exporters frequently experience changes in their export destination portfolios. However, what remains a fact is that the bulk of Botswana manufacturing exports in value (93%) are concentrated in the top ten export destinations, with South Africa being the predominant export destination.

More importantly, the study also provides some empirical evidence on the firm characteristics associated with the decision to export and the extent of coverage of different export destinations using the Zero-inflated Poisson regression model. The study has empirically explored the question of whether more productive firms are likely to be multi-destination exporters, and if in the affirmative, whether this positive effect is accentuated by exporting out of the SACU region. While the exporting-productivity literature has provided strong evidence on the positive relationship between the two, to the best of our knowledge, none of the previous empirical studies has explicitly considered exporting out of a predominant customs/trade bloc as a potential channel to enhance the productivity effect. This study intends to fill this gap by focussing on Botswana, where the majority of exporting firms in the manufacturing sector are heavily reliant on the SACU market for their exports. We argue therefore that for Botswana, the exporting-productivity nexus may be driven by whether firms export out of the SACU region or not.

The study therefore contributes to the exporting-productivity literature by bringing in the role of trade integration. If taken into consideration, contrary to theoretical predictions, the study reveals evidence that less productive firms are most likely to enter the export markets. We argue that this striking result is likely to be largely driven by the dominance of the SACU market for Botswana's manufactured exports. Furthermore, this can also be interpreted to signal the prevalence of tax incentives by the Government to support small firms (that comprise the bulk of the manufacturing firms) in an effort to induce employment creation, firm entry and export diversification. Such policies tend to shift resources to less productive

firms and hence have the adverse effect of undermining aggregate productivity growth and firm competitiveness. The results further show evidence that once firms are exporting, more productive firms, especially those that export out of the SACU region are more likely to be multi-destination exporters. In this light, the overall positive impact of productivity on number of export destinations served by a firm is more pronounced for firms that export out of the SACU region. This is the novel result of this study and these results are robust to the use of log investment per worker as a proxy for labour productivity.

Related to other firm characteristics, the study provides evidence that foreign-owned, large and older firms are those that are most likely to export. Once these firms are exporting, firm size and exporting experience matter for geographic export diversification. These results have important policy implications and thus call for the development of market access strategies that address inefficiencies that hinder firms' success in the export markets. Second, Government tax policy should be geared towards encouraging joint-ventures with the small firms, with a view to encouraging firms to export outside SACU. This is particularly crucial for Botswana, where policy makers expect firms to expand export destinations, in order to cushion the country against vulnerabilities associated with regional shocks.

Lastly, notwithstanding the study's potential contribution, its major weakness lies in a lack of proper measure of firm productivity due to data limitations. Thus, we suggest that further studies be done in the future once there are data that enable estimation of Total Factor Productivity (TFP) at the firm-level.

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Data Appendix

A. MERGING PROCESS STEPS

The identifier in the export transaction dataset is VAT number while in the other dataset it is the license number. Therefore, we could only merge the two datasets using firm name. The challenge is that firm names are written differently with some written as (Pty) Ltd while others are (PTY) Limited. So the first step we undertook was to generate a new identifier from the original firm names by extracting unwanted characters such as (Pty) Ltd, brackets, spaces, etc. This step was replicated in both datasets. We renamed the new identifier “idmap”. Below is an outline of the steps followed to merge the datasets:

- When the two datasets were merged using idmap, 646 firm names were matched.
- We then considered only firm names that didn’t merge, to ascertain if they are written differently in both datasets. After synchronizing the names, we repeated the first step and this round two of merging resulted in 665 firm names being merged. A concordance file was then developed using this subset of firm names as these are names that appear in both datasets.
- The concordance file is mapped onto the original datasets to develop an exporter_map and a manufacturing_map. Since the using dataset is the one containing the concordance file, then _merge==2 is zero.

- Finally, we extracted _merge==3 in the exporter_map and merged it into the manufacturing_map to have a complete dataset (including trade data and firm characteristics) of manufacturing firms which comprise of domestic manufacturers and exporting manufacturers.
- Before this final merging is undertaken, the two datasets are collapsed into firm-year observations. In the extracted exporter_map variables such as export scope, export variety, multi-destination dummy, etc are created before this dataset is merged into the manufacturing_map.

B. CHALLENGES ENCOUNTERED DURING THE MERGING PROCESS

1. Three cases of duplicates were identified in the firm characteristics dataset:
   Case 1: In a particular year, a firm with the same license number and same entries of the variables appeared twice. Since these were clear duplicates, the duplicates were dropped by idmap and license number.
   Case 2: This one involves a scenario whereby firm names are the same but license numbers are different with same entries of the variables. In this case duplicates were dropped by investment, employment and idmap.
   Case 3: This case involves a scenario whereby the firm names are the same but different license numbers and different entries on the same variable. In this case firm names with the same idmap were collapsed and duplicates were dropped based on the newly created identifier, idMAN.
2. For the export transactions dataset, we only considered case 3.
3. The firm age variable was created from the variable called “the first year the firm was established”, by defining firm age= (year – first year the firm was established) + 1. Where missing observations in the firm age variable exist and a firm is allocated different years on when it was first established, then a mode was taken.

C. MERGING RESULTS

Table 1: Final Merged Dataset

Result	Number of observations
Not merged	2471
From master	1079 (_merge==1)
From using	1392 (_merge==2)
Merged	1578 (_merge==3)

Note: Here the manufacturing_map dataset and exporter_map dataset were merged. The merged dataset is collapsed into firm-year observations.

D. Representativeness of the Dataset

Table 2a: Coverage of the Dataset, Manufacturing: Number of Firms, Exporters and Export Value (2003-2012)

	Export Value		
Year	**BURS dataset (billion)**	**Our dataset (billion)**	**Coverage (%)**
2003	2.82	1.56	53.32
2004	3.72	2.32	62.37
2005	5.50	2.14	38.91
2006	6.58	5.03	76.44
2007	10.2	6.91	67.75
2008	11.3	4.70	41.59
2009	9.14	3.82	41.79
2010	11.7	3.76	32.14
2011	13.1	4.65	35.50
2012	13.1	12.0	91.60
Total	87.16		54.14

Source: Author's elaboration from the merged dataset.

Notes: 1) The years 2010 and 2011 were outliers in terms of overall export value, which was attributable to one firm whose total export value for these years exceeded the annual average export value. Therefore, we excluded this firm in the years in question when we generated the annual export value.

2) In the export transactions dataset, the exporting manufacturing firms were identified via the ISIC revision 3, capturing divisions 15 up to 37.

Table 2b: Potential Data Recording Issues (2003-2012)

	(1)	**(2)**	**(3)**
Year	**Merged Manufacturing Exporters (BURS)**	**Merged Manufacturing Exporters (our dataset)**	**Discrepancy**
2003	251	167	84
2004	250	165	85
2005	258	171	87
2006	281	187	94
2007	285	202	83
2008	279	186	93
2009	275	133	142
2010	272	91	181
2011	264	159	105
2012	242	117	125
Total	2657	1578	1079

Source: Author's elaboration from the merged dataset.

Table 3: Distribution of Firms Across markets and Entry and Exit Dynamics

Country Destination	Rank	Total Exports	Share (%)	Exporters (average)	Entry	Exit	Net Number of Exporters
South Africa	1	27 400 000 000	61.26	438	299	166	133
China	2	3 890 000 000	8.70	14	12	7	5
Bangladesh	3	3 590 000 000	8.03	1	1	1	0
Lesotho	4	1 310 000 000	2.93	6	6	1	5
Namibia	5	1 230 000 000	2.75	55	21	13	8
Belgium	6	938 000 000	2.10	3	3	0	3
Germany	7	885 000 000	1.98	13	12	4	8
Austria	8	858 000 000	1.92	3	5	0	5
Democratic Republic of Congo	9	852 000 000	1.90	3	9	0	9
India	10	663 000 000	1.48	18	13	8	5
Angola	11	536 000 000	1.20	10	8	5	3
France	12	395 000 000	0.88	8	8	2	6
Malawi	13	336 000 000	0.75	15	17	8	9
Czech Republic	14	266 000 000	0.59	1	1	1	0
Denmark	15	215 000 000	0.48	2	3	3	0
Andorra	16	205 000 000	0.46	14	15	15	0
Kenya	17	197 000 000	0.44	5	4	4	0
Mozambique	18	183 000 000	0.41	11	5	3	2
Azerbaijan	19	112 000 000	0.25	1	1	1	0
Norway	20	100 000 000	0.22	2	4	4	0
Hong Kong	21	92 800 000	0.21	4	4	4	0
Egypt	22	73 400 000	0.16	1	1	0	1
Moldova	23	67 500 000	0.15	1	1	1	0
Antarctica	24	62 100 000	0.14	1	1	1	0
Iran	25	51 100 000	0.11	1	2	2	0
Gambia	26	30 500 000	0.07	1	2	2	0
Canada	27	26 400 000	0.06	8	5	5	0
Zimbabwe	28	24 800 000	0.06	37	28	16	12

Country Destination	Rank	Total Exports	Share (%)	Exporters (average)	Entry	Exit	Net Number of Exporters
Australia	29	23 300 000	0.05	5	5	5	0
New Zealand	30	21 200 000	0.05	1	2	2	0
Korea	31	18 800 000	0.04	2	2	2	0
Saudi Arabia	32	13 000 000	0.03	1	1	0	1
United Kingdom	33	11 800 000	0.03	3	2	2	0
Italy	34	11 100 200	0.02	2	2	0	2
Zambia	35	9 175 181	0.02	15	13	4	9
Republic of Yemen	36	4 864 188	0.01	1	1	1	0
Finland	37	4 382 047	0.01	2	2	2	0
Madagascar	38	4 372 908	0.01	1	1	1	0
Mauritius	39	3 577 768	0.01	2	3	3	0
United States of America	40	3 422 058	0.01	6	5	5	0
Ghana	41	3 147 654	0.01	4	6	6	0
Mongolia	42	2 835 960	0.01	1	1	1	0
Bosnia and Herzegovina	43	2 083 046	0.00	2	2	2	0
Netherlands	44	813 726	0.00	3	2	2	0
Gabon	45	721 842	0.00	1	1	1	0
Peru	46	609 021	0.00	1	1	1	0
Tanzania	47	381 200	0.00	3	3	3	0
Oman	48	248 300	0.00	1	2	2	0
Antigua and Barbuda	49	159 952	0.00	1	1	1	0
Israel	50	132 337	0.00	1	2	2	0
Nigeria	51	97 895	0.00	2	2	2	0
Malaysia	52	49 127	0.00	1	1	1	0
Mali	53	17 987	0.00	1	1	1	0
Uganda	54	9585	0.00	1	1	1	0
Senegal	55	8683	0.00	1	1	1	0
Thailand	56	5604	0.00	1	1	1	0
Total		**44 729 916 269**	**100.00**				

Table 4: Robustness Check for the Determinants of Geographic Export Diversification (2007 - 2012)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Zero-Inflated Poisson Model (Baseline)		Zero-Inflated Poisson Model (Extended)	
VARIABLES	Logit Model	Poisson Model	Negative Binomial Model	Destination Count	Non-exporting Logit	Destination Count	Non-exporting Logit
Lag productivity	-0.112	-0.003	-0.003	0.009***	0.113***	0.009**	0.087***
	(0.098)	(0.005)	(0.005)	(0.004)	(0.011)	(0.004)	(0.011)
Citizen_owned_dummy	-0.549*	0.963***	0.974***	-0.114*	-52.189***	-0.079	-44.682***
	(0.323)	(0.190)	(0.192)	(0.061)	(1.008)	(0.057)	(1.008)
Joint_venture_dummy	-0.442	0.514***	0.515***	-0.058	-33.768***	-0.052	-29.034***
	(0.306)	(0.187)	(0.150)	(0.074)	(1.488)	(0.065)	(1.488)
Log number of employees	0.451***	0.832***	0.830***	0.156***	-45.541***	0.132***	-38.729***
	(0.136)	(0.081)	(0.047)	(0.026)	(0.634)	(0.022)	(0.626)
Exporting experience (years)	0.285***			0.061***		0.059***	
	(0.094)			(0.016)		(0.015)	
Age (years)		0.077***	0.078***		-2.375***		-2.028***
		(0.015)	(0.015)		(0.137)		(0.137)
Out_of_SACU dummy						0.343***	
						(0.062)	
Lag productivity*Out_of_SACU						0.003	
						(0.007)	
Constant	-0.097		0.622	-0.094	27.782***	-0.113	24.025***
	(1.526)		(1.601)	(0.090)	(0.079)	(0.080)	(0.076)
Industry control	Yes	No	No	No	No	No	No
Year control	Yes	No	No	No	No	No	No
Observations	405	2,202	2,202	2,202	2,202	2,202	2,202
Zero Observations		1314	1314	1314		1314	
Vuong test (z)				19.4		19.95	
AIC		1684.395	1685.939	2859.084		2810.573	
BIC		1712.88	1720.122	2927.449		2890.333	
Number of unique_id	180	367	367				

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Over-dispersion test

ystar	Coefficient	Standard error	t	P>|t|	95% confidence interval	
muhat	0.2802352	0.0102373	27.37	0.000	0.2601431	0.3003273

Table 6: Exporter Premia (2007 – 2012)

VARIABLES	(1) Investment	(2) Turnover	(3) Employment	(4) Age	(5) Investment/Worker	(6) Turnover/Worker
Exporter	0.975***	1.034***	0.660***	0.210***	0.309***	0.367***
	(0.077)	(0.089)	(0.052)	(0.051)	(0.062)	(0.071)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ownership fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	14.108***	15.208***	3.345***	2.265***	10.767***	11.810***
	(0.221)	(0.251)	(0.150)	(0.140)	(0.191)	(0.200)
Observations	1,640	1,563	1,641	1,497	1,632	1,558
R-squared	0.183	0.181	0.139	0.031	0.079	0.093

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: 1) Values are given in natural logarithms.

2) Robust standard errors clustered at the firm level.

3) Data pooled over the period 2007 – 2012.

Source: Author's calculation using the merged dataset.