J Int Entrep (2016) 14:9–31
DOI 10.1007/s10843-016-0170-3

International SMEs from emerging markets—Insights from the Colombian textile and apparel industry

Maria Alejandra Gonzalez-Perez[1] · **Eva Cristina Manotas**[2] · **Luciano Ciravegna**[3,4]

Published online: 21 April 2016

Abstract The internationalization of firms from emerging markets has been studied mainly from the perspective of large firms. Smaller and younger international firms based in emerging markets suffer from underrepresentation in the literature. This study sheds light on the internationalization of emerging market SMEs, focusing on Colombian textile and apparel exporters. Using mixed research methods, it illustrates the role of firm age in influencing internationalization strategy. It examines 1165 export contracts by 50 SMEs, discussing export intensity, speed, and geographic scope using recurrence analysis and cluster analysis. It contributes to international entrepreneurship by exploring new empirical evidence and examining it using a novel methodological approach.

Keywords Emerging markets · Latin America · SMEs · Internationalization · Recurrence analysis · Cluster analysis · Exports · Textiles · Colombia · Apparel industry

✉ Maria Alejandra Gonzalez-Perez
mgonza40@eafit.edu.com

Eva Cristina Manotas
ecmanota@unal.edu.co

Luciano Ciravegna
Luciano.ciravegna@kcl.ac.uk

[1] Organization and Management Department, Business School, Universidad EAFIT, Medellin, Colombia

[2] Organization Engineering Department, Facultad de Minas, Universidad Nacional de Colombia, Carrera 80 No 65-223, Medellin, Colombia

[3] Political Economy of Emerging Markets, King's College, University of London, WC2R 2LSroom 8G, Chesham Building, London, UK

[4] INCAE, Alajuela, Costa Rica

JEL Classification M160 · F140 · F23

Introduction

According to theoretical frameworks based on the 1970s' Uppsala Model (Johanson and Wiedersheim-Paul 1975; Johanson y Vahlne 1977), the internationalization of companies is based on a gradual and sequential process, in which companies initiate their international involvement through exports after a period of accumulated experience serving their domestic markets (Almodóvar y Rugman 2014; Eteman and Wright 2003). However, other authors have demonstrated that the model of sequential stages does not allow generalization to explain all cases of firm internationalization (Cuervo-Cazurra 2011; Hadjikhani et al. 2014). Regarding the speed of internationalization, it has been revealed that some firms have a rapid process of venturing internationally soon after inception in the first 2 years of existence (Cavusgil and Knight 2015; Madsen 2013; Oviatt and McDougall 1994).

The most important dimensions of internationalization of small and medium-sized enterprises (SMEs) are speed, intensity, and geographic scope. The first, generally calculated as time between inception and the first foreign market entry has been the focus of the literature on born globals (BGs) and new international ventures (Cavusgil and Knight 2015; Coviello 2015; Freeman et al. 2013). Intensity, often measured as the share of total sales sold in foreign markets, distinguishes firms that are mainly domestic even if exporting quickly from firms that rely mainly on foreign sales for their revenues. Geographic scope reports the target of a firm's exports, illustrating whether it is truly global, regional, or simply sells in two markets (Lopez et al. 2008).

BG scholars enriched the debate on internationalization with insights from entrepreneurship and marketing (Zander et al. 2014). Nonetheless, internationalization is more complex and other aspects must be studied: Prange and Verdier (2011) state that companies differ regarding their internationalization, both those belonging to the gradual group and those belonging to the accelerated internationalization group. Some authors state that companies can behave irregularly and/or non-incrementally in certain markets while behaving incrementally in others (Cuervo-Cazurra 2011; Hadjikhani et al. 2014). On the other hand, Welch and Paavilainen-Mäntymäki (2014) highlight that existing research is dominated by linear methods, especially regression studies. We hereby examine new empirical information on 1165 foreign sales by Colombian textile exporters using mixed research methods, responding to calls for different methodological approaches. Using cluster analysis, we find two different groups of firms—young exporters and old exporters. We then examine their export sales using recurrence data analysis, which allows identifying the frequency of foreign sales per year per firm. We show that firm size does not entail that firms behave in the same way, whereas firm age gives rise to different internationalization paths.

Although, Colombia, together with Brazil, Chile, Peru, and Mexico due to the fast-paced growth of their economies and their institutional progress toward a sustainable economic progress are considered the emerging markets in Latin America (Cardoza et al. 2015). In Colombia, the legal structure of business sector is classified into micro, small, medium, and large enterprises. This classification was implemented by the Law

590 in 2000. According to this legislation, an SME is a company which has assets between 500 to 30,000 Colombia monthly minimum wage (estimated of $100,000 and $600,000).Nonetheless, several scholars point to the fact that we continue to know little about small young exporters in emerging markets, and particularly in Latin America (Cardoza et al 2015; Gonzalez-Perez and Velez-Ocampo 2014; Felzensztein et al. 2015; Ciravegna et al. 2014; Felzensztein 2014). Thus, our study also responds to the call for more empirical evidence about SMEs based in Latin America.

The remainder of the paper is structured as follows:

The "Literature review" section discusses prior literature related to international behavior of BGs and other types of export firms. The adopted methodological approach is provided in the "Methodology" section. This section presents a description of the studied sector and sample characteristics; it also offers a detailed explanation of the recurrence data analysis methodology, as the paper aims to provide a methodological contribution to the field of international entrepreneurship. It proposes an alternative methodology (recurrence data analysis) to determine whether a lineal proportional relationship exists between export and import intensity and the age and size of firms. The "Results" section summarizes the study's main findings and, finally, the "Conclusion" section contains this study's final conclusions, contributing to an understanding of the international expansion of textile and clothing firms in developing countries.

Literature review

Companies with gradual or sequential internationalization (Johanson and Vahlne 1977, 1990, 2009) are described as companies that focus on domestic markets for extended periods. According to Baum et al. (2011), Burgel and Murray (2000), and Vissak (2010), this period is approximately 10 years or more. Then, these companies (both large firms and SMEs) enter destinations with similar or well-known markets (Bell, McNaughton, Young, and Crick 2003). Subsequently, they will enter different markets (Johanson and Vahlne 1990). They also have a narrow market scope (Kuivalainen et al 2012) and should not achieve a significant export quota.

Early internationalized SMEs are more proactive than firms with a sequential internationalization process (Oviatt y McDougall 1994). Some do not have local sales before entering external markets (Chetty and Campbell-Hunt 2004; Madsen 2013). Knight and Cavusgil (1996), Kuivalainen, Sundqvist, and Servais (2007), Kuivalainen et al. (2012), and Madsen (2013) highlight that BGs must achieve 25 % or higher exports and enter into remote foreign countries at the most 3 years after their creation. Madsen and Servais (1997) state that these companies try to obtain significant advantages by selling products in several countries right from their creation. There is still an ongoing debate about SMEs that internationalize while young, with scholars disagreeing, for example, on the maximum number of years SMEs may take to export or the ways in which to define whether it is global or not (Zander et al. 2014). This calls for more research on the internationalization path of SMEs in comparison to that of other firms—not multinational enterprises (MNEs), on which most international business literature focuses, but also, and especially, firms that are similar to BGs in terms of their size and industry, but different in terms of their

internationalization (Kuvailanen et al. 2007). We use cluster analysis to identify groups of SMEs and find that firm age is an important distinguishing factor.

Given the differences between the companies in each group, it is important to study the export behavior and/or performance for each group of companies (BGs and non-BG SMEs), thus reducing estimate variability.

One of the key areas of internationalization research has been internationalization performance.

The study of SMEs' export performance has attracted the growing attention of scholars and managers (Aulakh et al. 2000; Brouthers and Xu 2002; Cadogan et al. 2009). Globalization has become an indisputable reality that has led an increasing number of companies to seek foreign opportunities in order to survive. Therefore, increasing globalization has made exports an important activity for many companies (Leonidou and Katsikeas 1996). On the other hand, exports require a minimum amount of financial and human resources and greater resource commitments compared to other forms of income (Cavusgil and Knight 2015). They tend to be the most common form of entering the global stage, a profitable way of quickly penetrating new external markets (Leonidou and Adams-Florou 1999). However, international markets tend to be more diverse, and in many cases more hostile, than domestic ones, and a clear understanding of export performance and behavior is important.

In spite of the considerable amount of research work on export performance of SMEs, evidence on factors affecting it is largely fragmented and often contradictory (Cavusgil and Zou 1994; Zou and Stan 1998; Sousa 2004; Cavusgil and Knight 2015). The main reason for this seems to be a lack of agreement around conceptualizing and putting into practice a definition for export performance, and this issue gives rise to a variety of measurement methods that emphasize different dimensions of performance (Diamantopoulos 1998; Oliveira et al. 2012). These different measurement schemes make it difficult to compare the results of different studies, as it is complicated to determine whether contradictory results can be attributed to independent variables or to the use of different export performance measurement scales (Zou et al. 1998). It is further complicated by the fact that, although export performance measurements have been discussed (Katsikeas, Leonidou, and Morgan 2000; Shoham 1998), there are still disagreements surrounding the construct that measures and captures them most appropriately. Several studies have tried to research and develop metrics for export performance (Styles 1998; Zou, Taylor, and Osland 1998; Lages and Lages 2004). This indicates that export performance is a multifaceted concept and that any single measurement construct is insufficient for a reliable evaluation (Shoham 1998).

For performance evaluation, studies may use objective or subjective measures or both. Most studies use both forms of evaluation. However, certain authors support the use of subjective indicators over objective ones (Katsikeas, Piercy, and Loannidis 1996; Robertson and Chetty 2000). The different reasons for supporting this decision include the fact that SMEs are usually extremely reluctant to provide researchers with objective data (Francis and Collins-Dodd 2000; Leonidou et al. 2002) and usually, objective data is not easily available to the public. Therefore, it is extremely complicated to verify the precision of figures on any financial report (Robertson and Chetty 2000). The methodology to be applied in this study, which will be described in detail in the following section of this paper, has access to official information, and export event records with their

corresponding values are available for the sample studied over a period of 10 years (2000–2012).

Katsikeas et al. (2000) highlight that there are many different ways to understand export performance. One focus consists of looking at export results in terms of export efficacy, export efficiency, and export adaptive capacity. Export efficacy refers to the degree to which exporters achieve their export goals and objectives (Lages and Montgomery 2004; Xiangyun and Peng 2012; Yan et al. 2015).

Export efficiency compares results (for example, income) to inputs (for example, costs), and includes traditional profit relationships, such as return on investment (ROI) (Jacobson 1987; Myers 1999; Oliveira et al. 2012).

Curiously, export efficacy and efficiency constructs are not mutually exclusive. In fact, SMEs export efficacy and export efficiency measurements may be identical: a company may have, as its profitability target, the objective of achieving a certain return on investment for every dollar invested in export operations. As such, a performance efficiency metric (ROI) could also act as a performance efficacy metric (Oliveira et al. 2012).

According to Katsikeas et al. (2000), export adaptive capacity refers to the company's capacity for responding to changes that occur in the market environment. However, adaptive capacities are superposed conceptually with market orientation (Kohli and Jaworski 1990). Market orientation is probably a potential reason for export sales performance (Cadogan et al. 2009). However, there is no evidence to suggest that the links between market orientation and sales performance and between market orientation and benefit performance are not linear (Narver and Slater 1990; Cadogan, Kuivalainen, and Sundqvist 2009). This is a problem for the apparent validity of "adaptive capacity as a notion for export performance," because it means increased adaptive capacity can sometimes have a negative effect on sales and profit.

Another approach for classifying SME export performance is to classify performance in terms of non-economic and economic results (Katsikeas et al. 2000). Non-economic results can play a key role in the creation of economic result intermediaries. For example, a company's degree of internationalization is partly a function of the number of markets of the countries where it has sales: companies that operate in more international markets may be less vulnerable to the fluctuations in internal demand in individual markets, and so may be more capable to endure market crises. Simultaneously, these SMEs may be better prepared to take advantage of growth opportunities arising in the markets where they already operate. Therefore, it would not be unusual for exporters to have expansion of their export operations into new markets as a formal strategic objective and, therefore, market expansion objectives could legitimately result in non-economic measures of export performance effectiveness. Based on this discussion, we can see clearly that non-economic factors can become important export performance indicators.

However, the most interesting export performance indicators are economic metrics: these contain sales-related dimensions, including sales and income growth compared to competitors (market share) and dimensions related to profit, including growth margins, ratios, and trends. In terms of export performing modeling determinants, economic performance indicators are the ultimate endogenous variables, with non-economic indicators playing important but intermediary roles.

For this work, we propose applying a multivariate analysis classification method, which takes into account economic metrics, including export intensity, and non-economic metrics, including the number of export markets and the export speed, for grouping SMEs from an emerging market country in Latin America (Colombia); subsequently, a recurrence analysis of export events is applied to each group of companies (in order to obtain models with less variability within each group of companies), in order to evaluate SME's export behavior toward the same target market.

Methodology

Sample and studied sector

Regarding the chosen sector in its home country, in 2014, the textile and clothing industry in Colombia generated nearly 14 % of all manufacturing jobs, i.e., 94,506 direct jobs (ProColombia 2015). Colombia has the reputation of having one of the most advanced textile and clothing industries in the Americas for over a century, and although the country has witnessed the entrance of foreign players, the domestic market is mostly directly served by local brands (Euromonitor International 2015). The domestic sales dynamic in the Colombian apparel industry has benefited from a rapid adjustment to foreign competitors and changes in fashion trends, along with credit facilities, marketing activities by apparel specialists, as well as from a growing number of shopping centers and department stores, and increased purchasing capacity per capita. Even though Colombia's GDP and the apparel industry was growing at a healthy pace, in 2015, the country's emerging economy was negatively affected by a sharp decline in oil prices and the consequent strong devaluation of the Colombian peso (in August 2015, the exchange rate surpassed COP 3200 to the US dollar, and for many years, this rate was below COP$ 2000). It is forecast that this will have a visible effect on the industry, as the inflation rate will increase and production costs will be negatively affected. However, it might have a positive effect on exports. According to the DANE (2015), the textile sector accounts for 3 % of the Colombian national GDP, 5 % of total Colombian exports, and 7.5 % of manufacturing GDP. Also, Colombian imports in this industry increased 15 % between 2010 and 2014 (DIAN, 2015). As of 2015, Colombia has signed 13 free trade agreements that provide this sector with preferential access to those specific countries.

The sector's production is concentrated in two industrial centers (Bogota-Medellin), which together account for over 75 % of national production.

The population to be studied corresponds to exporting SMEs in Colombia's textile, garment manufacturing, and fashion sector. During the observation period, there were 1275 companies in the sector that were exporting. We decided to take a stratified random sample to these companies to obtain 33 % (425) of the population, but in the end, out of the contacted companies, we only managed to get complete, detailed information for 50 SMEs that answered the survey and the export events of which could be found in the official foreign trade database of Colombia's Ministry for Trade, Industry, and Tourism (BACEX).

Although the sample obtained corresponds to 4 % of the total population of companies, the variable to be studied, corresponding to the export event and the export's destination and value, maintains important characteristics regarding the same variable throughout the population (Handwerker 2005; Firebaugh 2008; Urono 2013):

- The sample has the same distribution of small and medium companies as the population.
- The export destination countries for the sample are the same export destination countries for the population. No country was left out.
- The sample of export events and their respective values correspond to 30 % of the population's export values for all years.
- The variance of the sample's export records is 1.02 times the variance of the export records for the entire population.

Given the foregoing sample characteristics compared to the population, we can infer that the sample of export event records is representative for studying the entire population of records (Urono 2013).

Recurrence data analysis methodology

Recurrent events are events repeated over time for one same unit or system. This study includes companies that performed several exports to the Central American region. For each company, we have official records of export events for a single year and for all years and thus, for each company, export events are recurrent events, since they are events that arise not once, but several times.

When recurrence data analysis is applied, times or temporal distances between recurrences are not necessarily statistically independent, and so the main objective is not to model those distances or times. Recurrence analysis is a useful methodology for empirically estimating the behavior of recurrent events in an entire set of units, to monitor and predict the number and value of recurrent events, and to observe and determine whether the times between recurrent events in a single unit can be treated as independent or not (Meeker y Escobar 1998). Therefore, this analysis can be useful for empirically estimating the behavior of export events for all companies, for monitoring and predicting the number and value of export events, and for observing and determining whether the times between a single company's export events can be treated as independent or not.

How to analyze export events without recurrence analysis?

Export events would be studied individually for each company during each year. This would result in a trend curve for their average export events in every year from 2000 to 2012. If one wished to understand the behavior of the export events for each group of companies, we would also obtain averages for the number of export events or export values for each year.

Recurrence analysis allows us to estimate a function that accumulates the average number of export events per company over time, and additionally, the concavity of that

growth curve (because it is accumulative) allows us to infer whether the recurrence rate is growing, declining, or is constant. This type of analysis is more thorough as it allows taking into account recurrent events from all companies simultaneously as well as the moment they occur, which does not happen in a descriptive analysis.

On the other hand, we can evaluate the export behavior for each type of company with this methodology, without having to apply a regression model. When a regression analysis is applied to identify and estimate the effect of age, company size, and destination on export speed and intensity, linear association assumptions are made between dependent variables (export intensity or export speed) and regressors or independent variables (age, size, destination). These assumptions are conveniently forced for applying a regression analysis but their interpretation is artificial and unnatural (how can one suggest that export intensity has a proportional linear relationship to company age?).

Using recurrence analysis, we have identified that a relationship effectively exists between the age and size variables, but whether that relationship is linear, exponential or of any other type is not important. We know it exists and it is not important to estimate an artificial, highly variable, coefficient.

Analysis of recurrent events

Recurrent data emerges in diverse disciplines and knowledge fields (including clinical trials, manufacturing tests, reliability studies, and sociological research). This data specifically emerges when a specific event (or set of events) or unit (or set of units), which has been longitudinally observed, is repeated at separate points over the observed period (Andersen et al. 1993; Cook et al. 1996; Escobar et al. 2003; Lin et al. 2000). Studies of reliability in manufactured products can be found in the automotive industry (Kalbfleisch et al. 1991; Nelson 1998, Nelson 2000; Hu et al. 1998; Lawless 1995a; Lawless 1995b); IT and electronics goods, (Tobias and Trindade 1995; Trindade and Haugh 1980; Vallarino 1988; Nelson 1988); and electric energy (Nelson 1990; Ross 1989; Kvam et al. 2002), among others.

As was mentioned, recurrent data emerged when a unit (or set of units) monitored over time presents a particular event (or set of events) on several points of the observed longitudinal period. For example, the number of recurring episodes of health conditions in patients, or the number of repairs of a manufactured product, or, in this case, the age at which companies in a specific sector began exporting to a particular foreign country. In this case, this type of analysis will allow us to analyze the behavior of the rate of exports to international markets, and furthermore, will determine whether the number of export events per year increase are maintained or decrease over a given period of time and to a specific region.

Cumulative average function

The cumulative average function represents the expected number of accumulated recurrences up to a time *t*. Usually, this function is denoted by M(t) and is given by

$$M(t) = E[N(t)] = E[N(0,\ t)] \tag{1}$$

where, N(0, t) represents the cumulative number of recurrences of a unit during the period (0, t).

Recurrence rate

Given as m(t) and defined as the derivative of the cumulative mean function (CMF) of the population over time, also known as the intensity function, the expression for recurrence rate is

$$m(t) \equiv \frac{dM(t)}{dt} \tag{2}$$

where M(t) is the population CMF. Therefore, the recurrence rate represents the average number of recurrences per unit of time per population unit. For discrete data, it is assumed that this derivative exists. Figure 1 below illustrates three possible types of recurrent rate behaviors in the population CMF that can be observed in the estimated CMF.

From Fig. 1, it can be observed that according to the population CMF, the recurrence rate at a given time *t* (which is precisely the tangent to the curve at that moment of time) will typically behave in three ways: (a) the recurrence rate decreases over time; (b) the recurrence rate is constant over time; and (c) the recurrence rate increases over time.

The previous analysis allows us to define certain assumptions that will be discussed later in this paper, whether a homogeneous Poisson process (HPP) or a non- homogenous Poisson process (NHPP) can be applied for parametrical

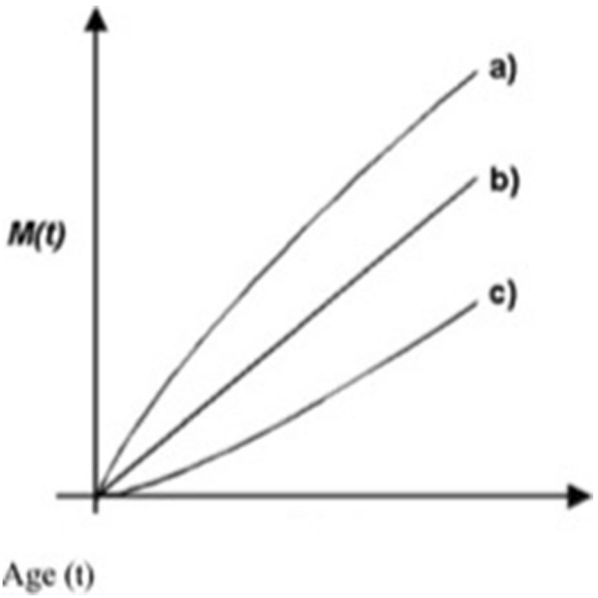

Fig. 1 Recurrence and typology

analysis. In this sense, if the recurrence rate is constant, an HPP could be applied, but if not, then an NHPP should be applied for this analysis.

Parametric analysis

The most commonly used parametric analysis is the Poisson process (homogenous and non-homogenous).

Poisson process The Poisson process is a simple parametric model commonly used for analyzing certain types of recurrence data. A Poisson process occurs when the following conditions are met:

- The number of cumulative recurrences at time zero is zero (represented as N(0) = 0)
- The number of recurrences in disjoint intervals is statistically independent. A process with this property has independent increase.
- The recurrent rate m(t) is positive and

$$M(\mathrm{a},\mathrm{b}) = E[\mathrm{N}(\mathrm{a},\mathrm{b})] = \int_a^b \mathrm{m}(\mathrm{t})\mathrm{dt} < \infty, \quad \text{when} 0 \leq \mathrm{a} < \mathrm{b} < \infty \tag{3}$$

Therefore, for a Poisson process, N(a,b): the number of recurrences in the interval (a,b) has a Poisson distribution as its probability distribution:

$$P[\mathrm{N}(\mathrm{a},\mathrm{b}) = d] = \frac{[\mathrm{M}(\mathrm{a},\mathrm{b})]^d}{d!}\exp[-\mathrm{M}(\mathrm{a},\mathrm{b})], \quad d = 0,1,2,\ldots \tag{4}$$

Homogenous Poisson process The HPP is a Poisson distribution with a constant recurrence rate, i.e., m(t) = 1/0. In this case: m(t) = 1 / θ.

N(a, b) has a Poisson distribution where M(a, b) = (b − a) / θ.

The expected number of recurrences in (a, b) is M(a, b). Similarly, the expected number of recurrences per time unit in which (a, b) is constant and equal to 1 / θ. This property is known as a stationary increment.

Times between recurrences $t_j = T_j - T_{j-1}$, are independent and equally distributed (iid) with an exponential distribution.

Non-homogenous Poisson process An NHPP model is a Poisson model with a non-constant rate of recurrence m(t). In this case, times between recurrences are not independent or equally distributed. The number of recurrences per time unit over the interval (a, b) is

$$\frac{\mathrm{M}(\mathrm{a},\mathrm{b})}{\mathrm{b}-\mathrm{a}} = \frac{1}{\mathrm{b}-\mathrm{a}}\int_a^b \mathrm{m}(\mathrm{t})\mathrm{dt} \tag{5}$$

An NHPP model is often specified in terms of the recurrence rate m(t). In order to specify an NHPP model, $m(t) = m(t, \theta)$ is used, as a function of a vector with unknown parameters θ.

For instance, the model for the potential recurrence rate is

$$m(t; \beta, \eta) = \frac{\beta}{\eta}\left(\frac{t}{\eta}\right)^{\beta-1}, \quad \beta > 0, \eta > 0 \tag{6}$$

The corresponding CMF over the interval (0, t) is $M(t; \beta, \eta) = (t/\eta)^{\beta}$. When $\beta = 1$, these models reduce to the HPP model.

Results

Cluster analysis

Our sample of firms, all SMEs textile exporters based in Colombia, is very homogenous in terms of size and industry focus. The main differences are the speed, intensity, frequency—recurrence—and geographic scope of internationalization. A survey designed to identify models of internationalization was applied to 50 SMEs in the textile and clothing industry. Using this instrument, data was obtained to measure firm age (AGE); export speed (VE: age in which the firm began to export); export intensity (IE: percentage of foreign sales over total sales); number of countries to which the company has exported (NCOUNTRIESEXPORT); number of countries from where the company imports (NCOUNTRIESIMPORT); positive perception by managers and entrepreneurs regarding the future of the company (PERCEPTION); and size of the company (STAFF: number of current employees).

A cluster analysis was applied to these variables, and two groups of companies were identified.

Our cluster analysis illustrates that there are two distinct groups of firms in the sample. The first, group 1, are younger, more aggressive exporters. They are on average 10 years old (young companies), internationalized quickly (on average 2 years after foundation), have high export intensity, and elevated geographic scope (more than ten export markets per firm), and import from one or two countries. We identified these firms as BG, as they match the definitions of most scholars (Cavusgil and Knight 2015; Zander et al. 2014).

The second group, group 2, is made up of older companies, on average 25 years old. They have lower export intensity than group 1 (17 % on average), their export experience began on average when they were 17 years old, and they have on average of 80 employees. They export on average to seven countries, and their imports come for only one or two countries.

Below, a descriptive analysis of exports to both identified groups within the cluster analysis will be presented. For this descriptive analysis, countries of export destinations (gathered by world regions) were identified. It was decided to gather countries into regions since the companies, in total, export to 130 different countries, and this limits the efficiency of the analysis.

Descriptive analysis of exports in group 1

The following table shows the number of the studied Colombia SME export events in the period from 2000 to 2012 in group 1 toward the different regions around the world (so as to provide a clearer export events table, the Americas were divided into North America, Central America, and South America).

We observed that for all years, the largest number of export events of the born globals studied in the textile and clothing industry are destined for Central America (out of 1165 export events, 580 are exports to Central America).

It can be seen that the value of exports was highest in 2007, and a decline of over 50 % can be observed from 2008 to 2012.

The value of exports to Central American countries is considerably higher than those to other regions around the world. This highlights the importance of studying the export intensity of these companies to Central America. A model for the export recurrence rate would show whether the export capacity of SMEs in group 1 measured by the speed or rate of recurrence is growing, remains steady, or is decreasing.

Descriptive analysis of exports in group 2

The following table (Tables 1, 2, 3, 4, and 5) shows the number of export events to Central American countries in the period from 2000 to 2012 in the firms classified as group 2. As in group 1, group 2 companies have more export events to Central America than to any other geographical region within the observation window (2000–2012). This confirms that, for both groups, this region is an important export destination for Colombian companies in the textile and clothing sector.

In Table 6 below, we can see that export values peak in 2008 and a decline of 50 % from 2009 to 2012 with regard to 2008. We can also see that the export value of group 2 companies is lower than the average export value of group 1 companies. As was

Table 1 Cluster analysis summary

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Analysis Summary
----------------
Data variables:
     AGE
     IE
     NCOUNTRIESEXPORT
     NCOUNTRIESIMPORT
     PERCEPTION
     STAFF
     VE

Number of complete cases: 49
Clustering Method: Ward's
Distance Metric: Squared Euclidean

Cluster   Members   Percent
---------------------------
1         32         65,31
2         17         34,69
---------------------------

Centroids

Cluster   AGE          IE           NCOUNTRIESEX NCOUNTRIESIM PERCEPTION   STAFF        VE
-------------------------------------------------------------------------------------------
1         9,71875      45,2813      10,7188      1,6875       8,6875       29,1563      2,65625
2         27,0         17,1176      7,41176      1,41176      7,23529      80,4706      17,2941
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Table 2 Observed export frequency in group 1

	AFRICA	ASIA	CENTROAMERIC	EUROPA	NORTEAMERICA	OCEANIA	SURAMERICA	Row Total
2000	0	0	19	0	3	0	6	28
	0,00%	0,00%	1,63%	0,00%	0,26%	0,00%	0,52%	2,40%
2001	0	0	20	1	2	0	7	30
	0,00%	0,00%	1,72%	0,09%	0,17%	0,00%	0,60%	2,58%
2002	0	0	31	3	3	0	14	51
	0,00%	0,00%	2,66%	0,26%	0,26%	0,00%	1,20%	4,38%
2003	0	1	32	3	6	1	17	60
	0,00%	0,09%	2,75%	0,26%	0,52%	0,09%	1,46%	5,15%
2004	2	3	47	6	9	3	17	87
	0,17%	0,26%	4,03%	0,52%	0,77%	0,26%	1,46%	7,47%
2005	0	6	54	7	7	1	17	92
	0,00%	0,52%	4,64%	0,60%	0,60%	0,09%	1,46%	7,90%
2006	2	5	49	13	7	3	16	95
	0,17%	0,43%	4,21%	1,12%	0,60%	0,26%	1,37%	8,15%
2007	2	3	59	11	7	1	23	106
	0,17%	0,26%	5,06%	0,94%	0,60%	0,09%	1,97%	9,10%
2008	0	5	52	11	7	2	25	102
	0,00%	0,43%	4,46%	0,94%	0,60%	0,17%	2,15%	8,76%
2009	5	6	57	15	11	3	29	126
	0,43%	0,52%	4,89%	1,29%	0,94%	0,26%	2,49%	10,82%
2010	3	6	49	16	10	3	28	115
	0,26%	0,52%	4,21%	1,37%	0,86%	0,26%	2,40%	9,87%
2011	1	5	60	19	11	4	34	134
	0,09%	0,43%	5,15%	1,63%	0,94%	0,34%	2,92%	11,50%
2012	5	8	51	25	14	2	34	139
	0,43%	0,69%	4,38%	2,15%	1,20%	0,17%	2,92%	11,93%
Column Total	20 1,72%	48 4,12%	580 49,79%	130 11,16%	97 8,33%	23 1,97%	267 22,92%	1165 100,00%

By destination region and year

mentioned previously, the export intensity of this group is almost half of that of the companies classified as group 1.

As can be seen in Tables 7 and above, export values to South American countries are considerably higher than the value of exports to other geographical regions (even higher than to Central American countries). Still, we should highlight that there is a higher number of export events to Central America as was observed for group 1 companies. This indicates the importance of studying the intensity of these companies'

Table 3 Average studied SMEs export sales per year in group 1

Code	Count	Mean	Standard Error	Lower Limit	Upper Limit
2000	28	56835,7	24755,2	32080,5	81590,8
2001	30	141274,0	88484,3	52790,0	229759,0
2002	51	98605,8	48895,9	49709,9	147502,0
2003	60	75549,0	21297,0	54252,0	96846,1
2004	87	2,4113E6	1,07932E6	1,33198E6	3,49061E6
2005	92	5,12477E6	3,00993E6	2,11485E6	8,1347E6
2006	95	3,86894E6	2,09166E6	1,77728E6	5,9606E6
2007	106	4,90313E6	3,16403E6	1,73911E6	8,06716E6
2008	102	4,10617E6	2,66187E6	1,44429E6	6,76804E6
2009	126	2,75902E6	1,53089E6	1,22813E6	4,2899E6
2010	115	1,62519E6	814318,0	810876,0	2,43951E6
2011	134	1,47964E6	829590,0	650046,0	2,30923E6
2012	139	1,50545E6	615920,0	889531,0	2,12137E6
Total	1165	2,52775E6	526747,0	2,001E6	3,05449E6

Table 4 Average value of the studied SME exports per region in group 1

Code	Count	Mean	Standard Error	Lower Limit	Upper Limit
AFRICA	20	8448,35	2087,54	6360,81	10535,9
ASIA	48	13492,4	2832,76	10659,6	16325,2
CENTROAMERICA	580	1,18259E6	276025,0	906564,0	1,45861E6
EUROPA	130	72851,7	19947,6	52904,1	92799,4
NORTEAMERICA	97	262033,0	79102,0	182931,0	341135,0
OCEANIA	23	104172,0	65085,8	39086,4	169258,0
SURAMERICA	267	8,31769E6	2,18397E6	6,13373E6	1,05017E7
Total	1165	2,52775E6	526747,0	2,001E6	3,05449E6

exports to Central America. A model to determine the recurrent export rate to Central America would indicate whether the internationalization capacity (via exports), measured according to speed or recurrence rate, of group 2 companies is growing, remains steady, or is decreasing.

Recurrence data analysis applied to Colombian SMEs in the textile and clothing industry: Observations from an emerging market perspective

First of all, both a parametric and non-parametric recurrence data analysis was applied to the entire sample of export events to Central American countries,

Table 5 Observed frequency of SMEs exports in group 2 (by destination region and year)

	AFRICA	ASIA	CENTROAMERIC	EUROPA	NORTEAMERICA	OCEANIA	SURAMERICA	Row Total
2000	0	0	20	1	3	0	19	43
	0,00%	0,00%	2,20%	0,11%	0,33%	0,00%	2,09%	4,73%
2001	0	0	23	1	3	0	19	46
	0,00%	0,00%	2,53%	0,11%	0,33%	0,00%	2,09%	5,05%
2002	0	1	29	0	2	0	17	49
	0,00%	0,11%	3,19%	0,00%	0,22%	0,00%	1,87%	5,38%
2003	0	2	33	3	6	0	21	65
	0,00%	0,22%	3,63%	0,33%	0,66%	0,00%	2,31%	7,14%
2004	0	1	34	5	3	0	26	69
	0,00%	0,11%	3,74%	0,55%	0,33%	0,00%	2,86%	7,58%
2005	0	1	32	4	4	0	21	62
	0,00%	0,11%	3,52%	0,44%	0,44%	0,00%	2,31%	6,81%
2006	0	2	40	11	7	0	30	90
	0,00%	0,22%	4,40%	1,21%	0,77%	0,00%	3,30%	9,89%
2007	0	3	38	11	6	0	26	84
	0,00%	0,33%	4,18%	1,21%	0,66%	0,00%	2,86%	9,23%
2008	1	2	31	8	8	1	24	75
	0,11%	0,22%	3,41%	0,88%	0,88%	0,11%	2,64%	8,24%
2009	0	2	40	9	7	1	26	85
	0,00%	0,22%	4,40%	0,99%	0,77%	0,11%	2,86%	9,34%
2010	0	1	32	9	5	0	27	74
	0,00%	0,11%	3,52%	0,99%	0,55%	0,00%	2,97%	8,13%
2011	0	4	37	9	6	0	34	90
	0,00%	0,44%	4,07%	0,99%	0,66%	0,00%	3,74%	9,89%
2012	0	1	35	7	6	0	29	78
	0,00%	0,11%	3,85%	0,77%	0,66%	0,00%	3,19%	8,57%
Column Total	1 0,11%	20 2,20%	424 46,59%	78 8,57%	66 7,25%	2 0,22%	319 35,05%	910 100,00%

Table 6 Average value of exports per year in group 2

Code	Count	Mean	Standard Error	Lower Limit	Upper Limit
2000	43	48485,6	11135,8	37349,8	59621,5
2001	46	53308,7	11694,3	41614,4	65002,9
2002	49	50898,6	16648,0	34250,6	67546,6
2003	65	39938,4	7784,37	32154,1	47722,8
2004	69	140660,0	52904,8	87755,5	193565,0
2005	62	99859,1	32260,5	67598,6	132120,0
2006	90	71294,3	14001,7	57292,6	85295,9
2007	84	119411,0	28280,4	91130,9	147692,0
2008	75	205804,0	99298,6	106505,0	305102,0
2009	85	193781,0	64411,1	129370,0	258192,0
2010	74	145641,0	62898,4	82742,5	208539,0
2011	90	104469,0	21912,8	82556,7	126382,0
2012	78	137011,0	34574,7	102436,0	171586,0
Total	910	115103,0	13230,6	101873,0	128334,0

without dividing them into two groups. This initial analysis permitted determining the speed and intensity of exports to Central America for the SMEs being studied.

It can be observed that the tangent of the cumulative function of the average number of export events to Central America is increasing. This indicates that the recurrence rate is increasing with SME age, i.e., the number or intensity of SMEs' export events to Central America is growing. This also leads us to infer an NHPP recurrence rate model. Tables 8, 9, 10, 11, 12, and 13 shows a configuration with the potential for estimating a rule for export intensity.

Note that the value of beta is 1.1623, and the limits of the confidence interval of 95 % for this estimate are greater than 1 (1.0734, 1.2513). This means the recurrence rate is not constant but growing.

By using this parametric model, the following recurrent export rate to Central American countries would be obtained:

$$m(t) = \left(\frac{1.1623}{0.4257}\right)\left(\frac{t}{0.4257}\right)^{1.1623-1} = 2.7303\left(\frac{t}{0.4257}\right)^{0.1623}$$

Table 7 Average value of exports per region in group 2

Code	Count	Mean	Standard Error	Lower Limit	Upper Limit
AFRICA	1	4858,0	0,0		
ASIA	20	6776,5	2090,09	4686,41	8866,59
CENTROAMERICA	424	80728,0	10790,0	69938,1	91518,0
EUROPA	78	12620,5	1630,63	10989,9	14251,1
NORTEAMERICA	66	232170,0	104593,0	127577,0	336763,0
OCEANIA	2	5601,0	2128,0	3473,0	7729,0
SURAMERICA	319	169455,0	26923,2	142532,0	196379,0
Total	910	115103,0	13230,6	101873,0	128334,0

Table 8 Summary of recurrent export data to Central American countries for studied SMEs

Number of recurrences = 949
Sum of costs/counts: 705,972,632.690001
Number of unique recurrence times = 73
Time units: AGE
Recurrence time minimum 1.0001 AGE
Recurrence time maximum 51.9999 AGE
Endpoint time maximum 52 AGE

Recurrence data analysis for SME exports to Central America (SME group 1)

The non-parametric analysis presented in Figs. 2, 3, and 4 below provides strong evidence of the growing trend of the tangent to the cumulative function of the expected number of recurrences. It is likely that the parametric model for the recurrent export rate to Central America by group 1 is an NHPP model with a non-constant, growing recurrence rate.

It is observed that the value of beta is 1.522 (greater than the estimate beta parameter for the entire sample of SMEs, 1.1623), and the limits of the confidence interval at 95 % for this estimate are larger than 1 (1.3697, 1.675). This implies that the recurrence rate is not constant but growing.

By choosing this parametric model, we would obtain the following recurrent SME export rate to Central American countries:

$$m(t) = \left(\frac{1.522}{1.009}\right)\left(\frac{t}{1.009}\right)^{1.522-1} = 1.5084\left(\frac{t}{1.009}0.522\right)$$

This function for the recurrence rate is growing and its growth trend is higher than the modeled recurrence rate for the entire sample (groups 1 and 2 together).

Recurrence analysis of export events to Central American countries (group 2)

For companies in group 2, the slope of the mean cumulative function (MCF) is apparently constant; this indicates that the intensity of export events to Central America

Table 9 NHPP model parameter estimates for recurrent export rates to Central America (entire sample)

NHPP power rule model
Response units: AGE
Maximum likelihood estimation results
Did not converge; false convergence
Log likelihood at maximum point 549.6
MLE Std.Err. 95 % lower 95 % upper
eta 0.4257, 0.07410, 0.2804, 0.5709
beta 1.1623, 0.04539, 1.0734, 1.2513

Table 10 Summary of recurrent export rate to Central America (SME for group 1)

Number of recurrences = 547
Sum of costs/counts 675,881,160.07
Number of unique recurrence times = 36
Time units: AGE
Recurrence time minimum 1.0001 AGE
Recurrence time maximum 22.9999 AGE
Endpoint time maximum 23 AGE

by companies in group 2 is not changing and tends to be constant. It is likely that when the NHPP is adjusted as the potential rule, the estimated beta parameter will not be statistically different from 1.

Here, we can observe that the value of beta is 0.83465 and the limits of the confidence interval at 95 % for this estimate include the value 1 (0.59580, 1.0735). This implies that the recurrence rate has a constant trend.

By choosing this parametric model, the recurrence rate of the number of export events to Central America is not changing and remains constant.

These results indicate a significant difference between groups 1 and 2 of the studied SMEs from an emerging market (Colombia). While for both groups, the Central American region is an important export destination; the export rate is growing for group 1, while the export rate of group 2 has stabilized and displays a constant trend. Group 1 shows a rising international focus that, despite declining exports in the sector since 2008, has managed to adapt and shows a clear trend for continued growth in exports to Central American countries. On the other hand, group 2 has a stronger orientation toward its domestic market, while at the same time maintaining stable exports to Central America. Although export intensity and speed are not decreasing for group 2, their efforts are not focused on increasing export recurrence to this region.

The studied SMEs from an emerging market country actively seek out foreign markets distributed throughout all continents (see Tables 4 and 6). However, even though this sector has experienced difficulties and downturns in their foreign sales, companies continue exporting. The descriptive analysis showed a decrease in the value of sales to Central American countries; conversely, the recurrence data analysis identified that the recurrence rate of export events showed a growth tendency for the group

Table 11 NHPP model estimates for recurrent exports to Central America (group 1)

NHPP power rule model
Response units: AGE
Maximum likelihood estimation results
Appears to have converged; relative function convergence
Log-likelihood at maximum point 345.5
MLE Std.Err. 95 % Lower 95 % Upper
eta 1.009, 0.1571, 0.7015, 1.317
beta 1.522, 0.0778, 1.3697, 1.675

Table 12 Data summary of recurrence export events to Central America (group 2)

Number of recurrences = 402
Sum of costs/counts 30,091,476
Number of unique recurrence times = 54
Time units: AGE
Recurrence time minimum 10 AGE
Recurrence time maximum 51.9999 AGE
Endpoint time maximum 52 AGE

of young companies with high export intensity that internationalized at an early stage (BG) and a constant trend for group of incumbent, older firms, with a moderate export intensity. These findings suggest that there is a strong interest in consolidating and strengthening current commercial relationships with Central American clients.

Therefore, the use of both methods permits a more comprehensive interpretation of the studied phenomenon, and it could be stated that even though the value of foreign sales shrinks, the number of export events grows. Consequently, it could be inferred that great attention is paid to establishing and consolidating current foreign clients (in Central American countries).

Conclusions

Our findings shed light on the internationalization of Colombian textile and apparel SMEs, illustrating that despite their similarity, these firms follow different paths. An interesting result here is that older exporters behave according to the gradual internationalization theory whereas young firms do not. Group 2 firms take longer to export, export less, penetrate a lower range of foreign markets, and depend mainly on their close neighbors, in this case South American countries, for their markets (Johanson and Vahlne 1977; Dunning and Lundan 2009). Group 1 firms, on the other hand, internationalize as predicted by the BG literature, in spite of being very similar in terms of size and sector to the Group 1 firms. They export quickly after inception, sell a higher share of their products abroad, enter a more diversified range of markets, and depend less on their immediate neighbors for export sales. In sum, they behave as BGs, although they

Table 13 NHPP model parameter estimates for the recurring export rates to Central America (SMEs in group 2).

NHPP power rule model			
Response units: AGE			
Maximum likelihood estimation results			
Appears to have converged; relative function convergence			
Log-likelihood at maximum point 223.5			
MLE	Std.Err.	95 % lower	95 % upper
eta	0.06694,	0.06899,	−0.06829, 0.2022
beta	0.83465,	0.12186,	0.59580, 1.0735

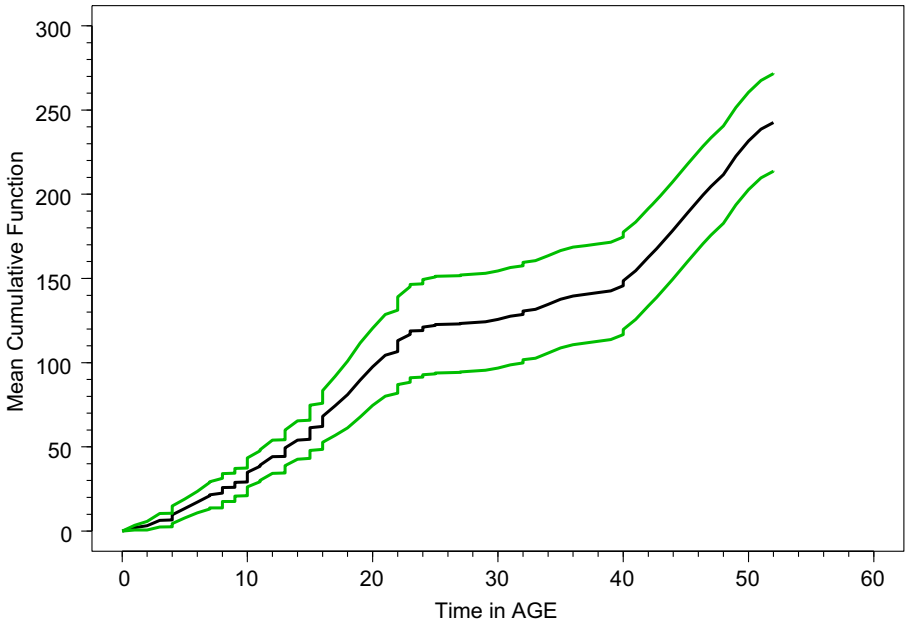

Fig. 2 Cumulative function of the average number of recurrent exports to Central America for all SMEs

do focus on exporting to Central America, which is a part of their own region, consistent with the Born Regional argument of Lopez et al. (2008); (Kuivalanen et al. 2007). The main difference between the two groups of firms is their age. This could be interpreted in different ways. First, it could mean that firms founded in a

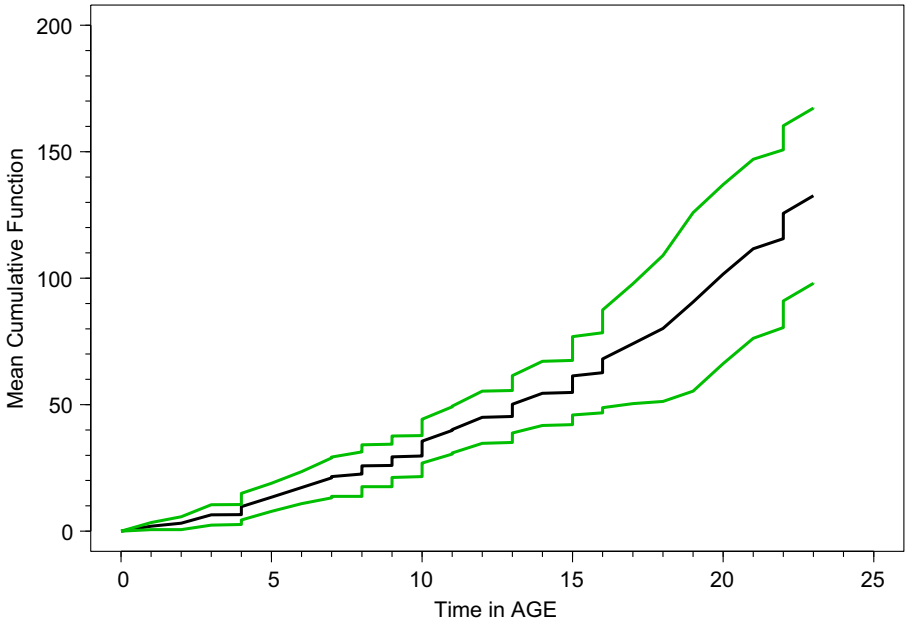

Fig. 3 Cumulative function of the average number of export recurrences to Central America (SMEs in group 1)

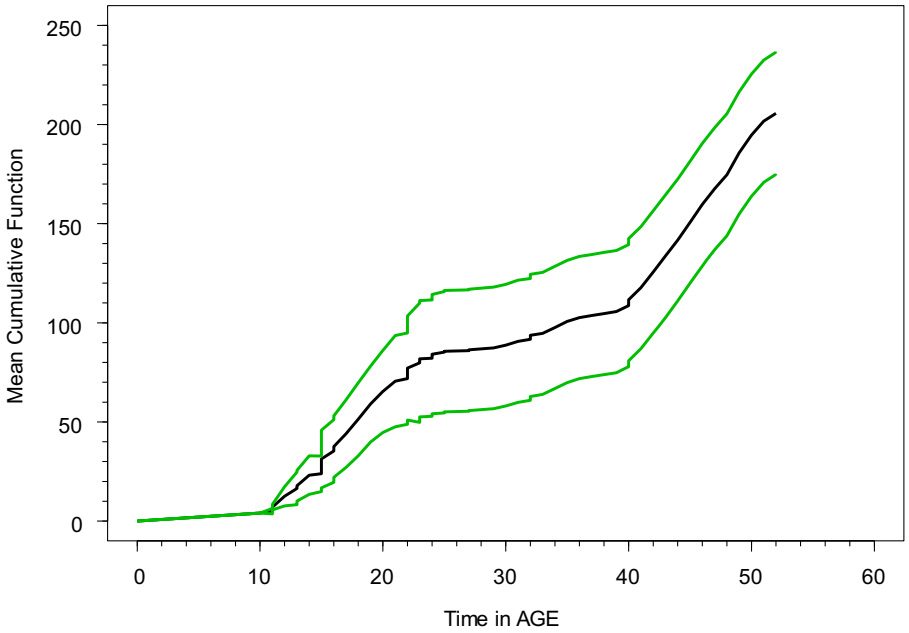

Fig. 4 Graph of the cumulative function of the average number of recurring exports to Central American countries for group 2 companies

different period, characterized by higher tariff barriers and lower globalization, take longer to enter their first foreign market. Second, it could mean that the entrepreneurs that founded companies during the 1980s or earlier did not have the same access to information and skills that helped younger firms internationalize. Further research, in particular qualitative research, on the drivers and challenges of internationalization for entrepreneurs based in emerging markets is needed to clarify these issues. Consequently, as an avenue for future study, designing and conducting in-depth qualitative studies in different sectors and different emerging market countries might contribute to the existing literature of internationalization of SMEs, and also to provide a substantial evidence-based contribution to policy making in order to support the growth of SMEs from emerging markets. Research objectives such as having a deeper understanding of how entrepreneurial experience increased (or/nor) the likelihood of exporting from emerging markets and identifying how emerging market SMEs can develop and sustain (foreign) sales considering macrodynamics of currency fluctuations are relevant questions and can have a substantial contribution both to theory and practice.

Our recurrence analysis provides further insights into the behavior of the two groups of firms, contributing to the SME literature with a novel methodological approach. It shows that the frequency of export sales may increase when total export value decreases, especially for BGs. This can be interpreted as BGs aggressively attempting to compensate for declining sales by looking for new clients and is in line with the predictions of the BG literature (Knight and Cavusgil 2004). The older firms in Group 1, on the other hand, do not increase the frequency of their foreign sales when their total exports decrease, showing a less aggressive approach to internationalization.

Our main contribution here is to show that by using a combination of research methods, it is possible to better understand the internationalization path of SMEs from emerging markets. The frequency of international sales is a very understudied phenomenon, and yet is a fundamental aspect of how smaller firms internationalize. Within the limits of our small sample of exporters, one industry, and one country, we show that use of this method can provide important insights into the behavior of BG and other types of smaller exporters and we hope to be able to extend our study into other geographical settings and industries.

The methodology used allows differentiating between and describing the recurrence rate of SMEs from emerging market export events between BGs and established companies. However, it also provides a framework for more comprehensive results, permitting a more appropriate and less biased interpretation of the studied events.

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