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## Unraveling industry, firm and host-region effects on export behaviors of international new ventures and established exporters

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## Abstract

While an extensive strategy literature seeks to explain differences in firm performance, little is known about how much firm, industry and host-regions matter in explaining heterogeneity in export behaviors. The international entrepreneurship literature has highlighted that firm-, industry- and host-region-level factors shape export behaviors, yet more research is needed about their relative contribution. We decompose the variance of export behaviors of 4,982 Belgian SMEs during 2006–2014. Results indicate that firm effects account for the largest part in the variation of export behaviors, followed by industry and host-region effects. However, host-region effects matter more for INVs whereas firm effects matter more for established exporters. There are no substantial differences in industry effects among either sample of firms. Our study contributes to the literatures on variance decomposition and international entrepreneurship.

Key words: new ventures; host-region effects; firm effects; export; variance decomposition

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## Non-technical summary

Exporting plays an important role in enabling firms to achieve their profitability and growth objectives. This is not surprising given that privately held SMEs often refrain from costly direct investments and generally prefer non-equity entry modes because it involves lower resource commitment and more flexibility. Exporting has become a popular and among the most observed mode of entering foreign markets. Interestingly, during the 2014-2018 period, SMEs accounted for 98% of exporting enterprises in the European Union (Eurostat, 2020).

Prior international entrepreneurship studies have provided important insights into the antecedents of exporting. First, exporting can be affected by factors internal to firms. Scholars following this view have examined how a firm's resources and capabilities influence its export behaviors. Second, exporting can also be influenced by factors external to firms. Scholars have focused on how industry structure and competitive conditions influence firms' export behaviors. Third, host-regional focus can also be a critical contingency of exporting. Different conditions in a host-region affect export-related costs such as search, negotiations, enforcement and monitoring costs due to economic, culture, social and institutional differences.

Despite a great deal of research on exporting, little is known about the relative contribution of firm, industry, and host region drivers in shaping exporting outcomes. Yet, investigating this question is an issue of theoretical importance. For scholars, a better understanding would clarify the determinants of exporting behaviors as exporting is one of the key strategies entrepreneurial firms can undertake. Therefore, before focusing on determining the best predictors of exporting at various levels of analysis, it is important to take a step back and understand which levels account for variance in firms' export behaviors. Thus, we conduct a variance decomposition analysis to identify the factors that explain the heterogeneity among firms, industries, and host regions that lead to the sourcing and realizing of exporting opportunities. From a practical point of view, the identification of these factors would enable managers to focus their attention on the most influential factors rather than peripheral ones.

We decompose the variance of export behaviors of 4,982 Belgian SMEs during 2006–2014. In our analyses, we also compare international new ventures (INVs) and established SMEs. INVs are defined as new ventures that are international within their first 6 years of existence. Our results indicate the existence of intriguing differences in the motivations of INVs and established exporters in pursuing exporting activities. Results indicate that firm effects account for the largest part in the variation of export behaviors, followed by industry and host-region effects. As the firm-level variables play the dominant role in explaining exporting differences among SMEs, managers should pay attention to understanding these variables. Internal organizational factors shape firms' decisions to export and engage in international activities. Further, our results show that host-region effects matter more for INVs whereas firm effects matter more for established exporters. We show that INVs' managers should pay more attention to the choice of the host region in which to compete given that host region effects play a more important role in shaping these ventures' exporting behaviors. There are no substantial differences in industry effects among either sample of firms.

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# 1 INTRODUCTION

The literature on international entrepreneurship has highlighted the important role that exporting plays in enabling firms to achieve their profitability and growth objectives (e.g., Autio, Sapienza, & Almeida, 2000; Lu & Beamish, 2001; Patel, Criaco, & Naldi, 2018). Not surprisingly, as exporting has become a popular and among the most observed mode of entering foreign markets (Baum et al., 2013; Cavusgil & Knight, 2015), privately held firms often refrain from costly direct investments and generally prefer non-equity entry modes such as exporting (e.g., Baum, Schwens, & Kabst, 2015; Cavusgil & Knight, 2015; Deng, Jean, & Sinkovics, 2018; Fan & Phan, 2007; Knight & Cavusgil, 2004). Typically, the level of exporting is reflected in the extent to which the firm sells its products in nations outside its home country (i.e., the percentage of total sales represented by each country) and the extent of geographic scope (i.e., the number of countries in which a firm has foreign sales) (e.g., Schwens et al., 2018).

Prior international entrepreneurship studies have provided important insights into the antecedents of exporting (e.g., Autio et al., 2000; Kiss, Fernhaber, & McDougall, 2018; Paeleman, Fuss, & Vanacker, 2017). Resource-based view (RBV) scholars (e.g., Barney, 1986; Wernerfelt, 1984) argue that exporting is affected by factors internal to firms. Scholars following this view have examined how a firm's resources and capabilities influence its export behaviors (e.g., Autio et al., 2000; Gomez-Mejia, 1988; Sapienza, Autio, George, & Zahra, 2006; Zahra, Ireland, & Hitt, 2000). Further, industrial organization scholars (e.g., Porter, 1980, 1986) argue that exporting is influenced by factors external to firms. Following this view, scholars have focused on how industry structure and competitive conditions influence firms' export behaviors (e.g., Boter & Holmquist, 1996, Fan & Phan, 2007; Patel et al., 2018; Zander, McDougall-Covin, & Rose, 2015). Next, some other scholars (e.g., Rugman & Verbeke, 2007) argue that the host-regional focus is a critical contingency of exporting. Different conditions in

a host-region affect export-related costs such as search, negotiations, enforcement and monitoring costs due to economic, culture, social and institutional differences (Patel et al., 2018).

Despite a great deal of prior research on exporting, little is known about the relative contribution of firm-level, industry-level and host-region-level drivers in shaping exporting outcomes. Yet, investigating this question can build understanding about the relative drivers of heterogeneity in exporting behaviors, which could inform future research and ultimately have practical implications. Testing firm, industry and host-region effects would offer valuable implications for managers' focus of attention (e.g., Short, Ketchen, Palmer, & Hult, 2007). Before focusing on what the best predictors might be at various levels, it is important to take a step back and understand what levels account for the primary variance in firms' export behaviors. If, for instance, industry membership plays a dominant role in firms' export behaviors, managers' decisions regarding which industry to compete in should become priority in the process of exporting. This study aims to address the lack of evidence in the international entrepreneurship literature on exporting regarding the relative contribution of firm-level, industry-level versus host-region-level factors to exporting. To investigate this heterogeneity, we conduct a variance decomposition analysis of firms' exporting behaviors−specifically, the export intensity and export diversity−as the outcome of heterogeneity among firms, industries and host-regions to source and realize exporting opportunities.

In these analyses, we also compare the contribution of the firm-level, industry-level and host-region-level factors to the variance of exporting behaviors in international new ventures (INVs) versus established firms. It is recognized that encouraging firms to export earlier, rather than later, will be more competitive and contribute toward a sustained increase in balance of foreign trade (Cumming, Fischer, & Peridis, 2015). An important part of privately held exporting firms are international new ventures (INVs) which are arising in sizable numbers

worldwide (e.g., Cavusgil & Knight, 2015; Fan & Phan, 2007; Knight & Cavusgil, 2004; Oviatt & McDougall, 1994; Zahra et al., 2000; Zahra, 2005). Oviatt & McDougall (1994, p. 49) defined INVs as "business organizations that, from inception, seek to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries."[1] Consistent with this literature, we examine INVs as new ventures that are international within their first 6 years of existence (Shrader, Oviatt, & McDougall, 2000; Zahra et al., 2000). The growing literature on INVs positions itself in contrast to the more established, staged and often sequential internationalization literature (e.g., Fan & Phan, 2007; Sapienza et al., 2006). As such, given these differences, it is difficult to generalize findings from studies on established exporters to INVs, and vice versa. It is also unclear if firm, industry and host-region factors affect export behaviors of INVs' and established exporters differently.

We use a data set comprising 20,020 firm-year observations, which represent 4,982 Belgian privately held small and medium-sized enterprises (SMEs) which export (i.e., generate foreign sales).[2] These firms operate in 54 two-digit NACE code industries and can export to 8 geographic regions. We use monte-carlo markov-chain (MCMC) methods implemented in the MCMCglmm package for the statistical software environment R to assess the variance in export behaviors accounted for by different levels of the firm, industry and host-region factors across exporting SMEs including INVs and established ones.

Our study makes several contributions. First, we add to the strategy literature on variance decomposition, which thus far has largely focused on decomposing the variance of firm performance. Prior decomposition studies have traditionally relied on accounting

[1] In this study, we use the term international new ventures rather than born globals. Born globals are defined as "young, entrepreneurial start-ups that initiate international business (typically exporting) soon after their inception" (Knight & Cavusgil, 2004). However, as many of the firms may not have a global focus, Oviatt & McDougall (1994) specifically use the term "international new ventures". Some firms may only export to a relatively limited number of countries (Coviello, 2015).

[2] In this study, we focus on SMEs which are the backbone of our economy. They represent 99% of all firms in the European Union. From 2014 until 2019, they created around 85% of new jobs and provided two-thirds of the total private sector employment in the EU (European Commission, 2019). SMEs account for over 50% of total exports and contribute to the overall growth in regional and national economies (OECD, 2014).

performance measures such as return on assets (e.g., Bamiatzi, Bozos, Cavusgil, & Hult, 2016; Karniouchina, Carson, Short, & Ketchen, 2013; Short, Ketchen, Bennett, & du Toit, 2006; Short et al., 2007) or other value-based measures of performance; i.e., economic profit or residual income and market-to-book value (Hawawini et al., 2003). However, scholars argue that simply possessing resources is unlikely to generate higher firm performance; rather, managers must "unlock" and use these resources first to convert them into performance and growth advantages (Penrose, 1959; Sirmon, Hitt, & Ireland, 2007). Bromiley (2005) also suggests that by directly tying resources to performance, researchers assume that managers make optimal decisions, thus eliminating the importance of strategic choice. Conversely, accepting the notion of strategic choice compels us to examine the factors that underlie the strategies managers use to realize firm performance. Exporting is one of the key strategies in this regard (e.g., Cavusgil & Knight, 2015). Consequently, we provide new insights into the extent to which SMEs' export behaviors are determined at the firm, industry and host-region levels. By doing so we also address calls from prior scholars that advances in multi-level modeling allow increased precision in quantitative international business research (Peterson, Arregle, & Martin, 2012) and entrepreneurship research (Holcomb, Combs, Sirmon & Sexton, 2010).

Second, our study contributes to the variance decomposition literature by using a longitudinal database of privately held SMEs that include INVs and established exporters. We do so because privately held firms are the dominant type of firms around the world (Fitza & Tihanyi, 2017). Data on privately held firms would provide results more representative of the entire economy (McGahan & Porter, 2002). However, most of the findings in the variance decomposition literature have been conducted primarily on publicly traded firms (e.g., Chang & Singh, 2000; Fitza, Matusik, & Mosakowski, 2009; Fitza & Tihanyi, 2017; Hawawini et al., 2003; McGahan & Porter, 1997, 2002; Meyer-Doyle, Lee, & Helfat, 2019; Short et al., 2007) or multinational firms (e.g., Makino, Isobe, & Chan, 2004; Tong, Alessandri, Reuer, &

Chintakananda, 2008) and with a specific focus on the dependent variable firm performance.[3] Scholars note that the aspects of multinational firms are substantially different from aspects of non-multinational firms and that these differences require special theory-building efforts (Verbeke & Ciravegna, 2018; Sundaram & Black, 1992). Our study shifts the focus of research to privately held SMEs that export. We only focus on independent firms; i.e., firms are not be controlled by an external (foreign) shareholder with an equity stake of 51% or more and firms are excluded when they own a foreign subsidiary by at least 51%. Given this, managers of these firms are likely to have greater discretion in making their strategic (exporting) moves.

Finally, we contribute to the literature on international entrepreneurship by shedding light on important microfoundations of exporting behaviors. Specifically, the study adds clarity about the differences in relative impact of firm, industry and host-regions factors in determining export behaviors. As an exploratory study, there is no theoretical framework that posits different levels of effect sizes concerning variation in the export behaviors. Nevertheless, our approach is theoretically guided by extant international entrepreneurship literature. Prior literature has found that firm, industry and host regions factors affect exporting behaviors. However, we find that firm level factors accounts for the majority of variance in firms' export behaviors, followed by industry level and host-region level factors.

Furthermore, we also examine how the roles of firm, industry and host-region levels of analysis differ between INVs and established exporters. INVs differ from established exporters by not following traditional theories of internationalization (Mudambi & Zahra, 2007; Oviatt & McDougall, 1994). One reason is that typically established exporters enjoy strong market positions, have deep pockets to support their export activities and strategic moves, and are well connected to other firms, which gives them access to different markets. In contrast, INVs have limited experience, suffer from liabilities of newness and foreignness, have limited access to

[3] One notable exception is Short, McKelvie, Ketchen & Chandler (2009) focusing on firm and industry effects on firm performance in new ventures.

industry networks at home and abroad, and often have limited resources (Sui & Baum, 2014). These factors can make them more susceptible to industry and host-region forces while attempting to overcome the limitations of their resources and capabilities. Our results highlight the importance of host-region level factors in INVs which represent the second largest part of the variance in this subsample. Although the largest part of the variance in export behaviors can be attributed to effects internal to the firm in both subsamples, our results show that firm level factors matter less in INVs than in established exporters. We do not find substantial differences in industry level factors in INVs versus established exporters. Overall, our study responds to calls for research that explores the role of industry and host-region effects on new venture internationalization (e.g., Andersson, 2004; Fernhaber, McDougall, & Oviatt, 2007; Zahra & George, 2002) as there is a predominant focus in the international entrepreneurship literature on firm-level antecedents (Reuber, Knight, Liesch & Zhou, 2018).

## 2 THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

International entrepreneurship scholars have examined the antecedents (e.g., Autio et al., 2000; Kiss et al., 2018; Paeleman et al., 2017) and consequences (e.g., Sleuwaegen & Onkelinx, 2014; Mudambi & Zahra, 2007; Sui and Baum, 2014) of exporting. Yet, despite the recognition of firm, industry and host-region related factors in inducing exporting and the benefits firms gain from it, researchers have not investigated the relative contribution of these variables (i.e., industry, firm and host-region) in explaining variations in export behaviors. Moreover, we also suggest that differences might exist in the relative impact of firm, industry and host-region effects on variation in export behaviors among INVs and established exporters. Such knowledge would enable scholars to build a better understanding of factors shaping exporting behaviors, which in turn can guide future research and have practical implications. To address this gap in the international entrepreneurship literature above, we utilize variance decomposition because it provides a methodology with which we can examine the relative

contributions of firm, industry and host-region level factors to export behaviors. A variance decomposition analysis partitions the variance observed into portions associated with different factors of interest.

### 2.1 Firm effects on export behaviors

The RBV has become an influential perspective in international business research (Barney, 1991; Hitt, Tihanyi, Miller, & Connelly, 2006; Peng, 2001; Westhead, Wright, & Ucbasaran, 2001; Teece, Pisano, & Shuen, 1997). It suggests that a firm's resources and capabilities underlie its ability to achieve competitive advantage and that firm-specific differences drive a firm's strategy (Barney, 1991; Helfat & Peteraf, 2003; Penrose, 1959). Two fundamental assumptions underlie the RBV. First, different firms hold different bundles of resources and capabilities, and some firms within the same industry may perform certain activities better than others based on these resource differences (Barney, 1991; Dierickx & Cool, 1989). Second, resource differences among firms can be persistent and less mobile because of their rarity and the difficulties encountered in acquiring or imitating those resources and capabilities (Barney, 1986, 1991; Reed & DeFillippi, 1990). As a consequence, firms possessing resource stocks which are valuable, rare, non-substitutable and inimitable have an advantage over their competitors (Barney, 1991; Chandler & Hanks, 1994; Carter, Williams, & Reynolds, 1997) in both domestic and overseas markets (Westhead, Wright & Ucbasaran, 2001).

Given that exporting exposes the firm to significant variance in institutional environments, economic development and cultural norms (Cuervo-Cazurra, Maloney & Manrakhan, 2007; Patel et al., 2018), consideration of firm effects in a more global context becomes valuable. This is especially the case among privately held SMEs whose ability to succeed in foreign markets is largely a function of their internal resources, capabilities and competences (e.g., Cavusgil & Knight, 2015; Knight & Cavusgil, 2004; Sui & Baum, 2014). Although tapping into a more diverse set of foreign markets may yield new opportunities

(Sapienza et al., 2006), it inevitably involves increased (1) liabilities of foreignness or the lack of resources needed to operate in new institutional environments, (2) liabilities of expansion or the lack of resources needed to operate at a larger scale and (3) liabilities of newness or the lack of resources needed to compete in competitive environments (Cuervo-Cazurra et al., 2007; Patel et al., 2018; Hashai, 2011). Exporting is also costly as firms have to build their network, advertise and build their brands, develop needed capabilities to manage and leverage their global supply chain, and manage the challenges of their institutional environment. Therefore, firms must find ways to overcome the additional resource requirements related to firm export behaviors (Paeleman et al., 2017; Kiss et al., 2018).

Within the international entrepreneurship literature, scholars have examined the specific effects of firm-specific variables on firms' export behaviors. Researchers investigated, for example, the effects of management know-how (e.g., Beleska-Spasova, Glaister, & Stride, 2012; Knight & Cavusgil, 2004), the age of principal founders (e.g., Westhead et al., 2001), international business competence (Knight & Kim, 2009), financial and human resources (e.g., Paeleman et al., 2017; Kiss et al., 2018), international knowledge and experience (e.g., Fernhaber, McDougall-Covin, & Shepherd, 2009; Filatotchev, Liu, Buck, & Wright, 2009) on exporting. Firm-specific characteristics explain firms' motivations to export. Scholars clearly indicated that the achievement of internationally sustainable competitive advantage depends on the possession of unique assets (Barney, 2001; Bloodgood, Sapienza, & Almeida, 1996) and, as such, even small firms with constrained resources can become players in international competition (Oviatt & McDougall, 1994). Firm-specific variables are likely to play an important role in explaining export behaviors among SMEs where resources are limited and firms tend to work hard to distinguish themselves from their competition. Thus,

*Hypothesis 1. A significant portion of the variation in SMEs' export behaviors is attributable to firm effects.*

## 2.2 Industry effects on export behaviors

The industry-based view, pioneered by Porter (1980, 1986), argues that conditions within an industry, to a large extent, determine a firm's strategy. Scholars point out that a firm's opportunities or constraints are not only connected to its idiosyncratic resources and capabilities as argued by the RBV, but also reside in its environment (Porter, 1991). Firms make optimal decisions given the structure of their environments. The managerial perceptions of the firm's environment influence executives' strategic choices (e.g., Keats & Hitt, 1988; Miller, 1993; Milliken, 1987, 1990). These perceptions alert managers to both threats in its firm's domestic market and opportunities in its foreign markets, and, as such, encourage them to consider expanding internationally through exporting (Calof, 1994; Zahra, Neubaum, & Huse, 1997). In an attempt to alter their position in the industry relative to their competitors and suppliers, firms develop and implement competitive strategies that reflect the challenges and opportunities in their environment, especially their main industry (Keats & Hitt, 1988). Hence, industry factors play a critical role in determining and limiting a firm's strategic behavior such as exporting.

Johanson and Vahlne (1977) were among the first to suggest that the conditions in a firm's domestic environment determine the sequence of the events undertaken in the internationalization process. The home industry conditions of exporting SMEs may add constraints (under local industry dynamism) or increase buffers (under local industry munificence) (Patel et al., 2018). Dynamism is the rate of change and magnitude of instability in the environment generating greater uncertainty and knowledge asymmetries among competitors (Dess & Beard, 1984). Munificence is the availability of resources in the environment when industries are growing (Castrogiovanni, 1991). According to the industry-based view (e.g., Porter, 1980), an exporting strategy of SMEs crucially depends upon the home industry environments (Patel et al., 2018; Zander et al., 2015).

Cavusgil (1980) notes that a firm's export marketing strategy is explained by management's desire to overcome unfavorable conditions in the domestic market, such as intense competition or hostile regulatory environment. Eshghi (1992) also noted that environmental conditions, such as saturation of the domestic market, pressure firms to become active exporters. Porter (1990, p. 86) also suggested that exploiting opportunities in international markets becomes an option when "firms are better able to perceive, understand, and act on buyer needs in their home market.". In this way, they can leverage their learning, skills and abilities in exploiting opportunities in foreign markets. Overall, researchers pointed out that a SMEs' export efforts are influenced by the conditions of its industry environment (e.g., Cavusgil & Zou, 1994; Colantone & Sleuwaegen, 2010; Patel et al., 2018). This suggests that industry level factors explain a meaningful amount of variance in firm export behaviors. Thus,

*Hypothesis 2. A significant portion of the variation in SMEs' export behaviors is attributable to industry effects.*

**2.3 Host-Region Effects on Export Behaviors**

When firms attempt to launch a product on a global stage, i.e., through exporting, they will be confronted with opportunities but they must also process information related to understanding the host-region conditions where they export their products to. Scholars define regions as a grouping of countries with physical continuity and proximity (Arregle, Beamish, & Hébert, 2009; Arregle, Miller, Hitt & Beamish, 2013; Patel et al., 2018). Such physical nearness carries shared properties or a sense of unity (Aguilera, Flores, & Vaaler, 2007). Regions are therefore geographically distant, economically different and characterized by internal attempts to realize greater cohesion (Rugman & Verbeke, 2007). Exporting to different regions allow firms to overcome market imperfections in different regions, access to different resources and maximize

market opportunities (Patel et al., 2018). Further, trade barriers are different for firms selling in Europe than firms selling to China.

However, firms need to deal with liabilities of regional foreignness when venturing abroad as there might exist among regions differences in government policies, culture, market requirements, and economic and political risks (Patel et al., 2018). The complexity and diversities of operations escalate when firms operate across different regions (Qian, Li & Rugman, 2013). Firms will be confronted with different geographical, institutional, cultural, regulatory, cognitive and economic roots which increase coordination and learning costs. Rugman and Verbeke (2004), for instance, found in a sample of multinational enterprises that it is challenging for a firm to manage an internal network spanning more than a single region due to complexities and diversities. For exporting SMEs, efforts to export to different regions are even more complex, more resource demanding and less standardized compared to efforts to increase sales within a particular region or country (Paeleman et al., 2017). When entering into different regions firms will be confronted with transportation, coordination and travel costs, costs resulting from lack of legitimacy, costs based on unfamiliarity with different environments, costs resulting from different regulations and trade laws, and costs arising to deal with more varied types of national systems, customers, cultures, political frameworks, rules and norms (e.g., Deng et al., 2018; Leonidou, 2004). Coeurderoy and Murray (2008) found that entry locations of UK and German new-technology-based firms are substantially influenced by the regulatory environments of their target regions.

Different geographical regions thus require different sets of information that SMEs must aggregate, collate and interpret to develop a portfolio of export markets. Foreign firms, not one of the member countries of a regional economic group such as for example Asia, Europe, North-America, among others, will face extra burdens compared to foreign rivals from member countries (Miller & Richards, 2002). As such, regional differences between the home country

and host-regions they target for export activities lead to a variation in export behaviors. Scholars have shown that geographical regions are an important level of analysis for understanding export behaviors (e.g., Ghobadian, Rugman & Tung, 2014; Patel et al., 2018). Thus,

*Hypothesis 3. A significant portion of the variation in SMEs' export behaviors is attributable to host-region effects.*

**2.4 Differences between INVs and Established Exporters**

When studying exporting SMEs, scholars need to consider the stage of the firm' life-cycle. Not firm size or even scope of foreign operations but firm age is a defining characteristic as size and scope may be greatly influenced by how early and quickly firms grow and export from its inception (Coviello, McDougall & Oviatt, 2011). Within the international entrepreneurship literature, exporting SMEs are of great interest. However, it is important to recognize the phenomenon of firms that export rapidly from the early stages of their organizational lives (Hashai, 2011). Care should be taken by not identifying established exporters in the same vein than a start-up or new venture that export. Small firms may be well-established in terms of its organizational experience and other characteristics (Coviello et al., 2011) and exporting of new ventures may not unfold in a slow and incremental manner but more in a proactive way (Baum et al., 2015; Patel et al., 2018).

In comparison to established exporters, new ventures face particular challenges stemming from liabilities of newness (Stinchcombe, 1965) which relates to actions and learning that managers have to overcome to address major challenges of adaptations to factors internal and external to the firm (Choi & Shepherd, 2005). For instance, they have to discover the most effective and efficient ways of operation and will be confronted with learning new tasks while at the same time develop brand recognition and market acceptance. Their lack of performance history and consequent relative illegitimacy in the eyes of external stakeholders such as

customers, suppliers, and financial markets also serve as a burden when they seek to acquire resources.

Industry membership plays a significant role in the process of exporting (e.g., Porter, 1980). Scholars, for instance, argue that the exporting strategy followed by new ventures, where the focus is on rapidly growing revenues from international markets, crucially depends upon the degree of competitiveness of the particular industry (Boter & Holmquist, 1996; Coviello & Munro, 1995; Zahra & George, 2002), the size of its home market (Fan & Phan, 2007) and the industry structure (Fernhaber et al., 2007). Yet, the intensity of global competition in an industry, environmental changes or shifting consumer preferences create substantially more challenges for new ventures compared to established exporters (Delmar, Davidsson & Gartner, 2003). However, the ability to adapt to new and dynamic environments is key to INVs' survival (Autio et al., 2000; Sleuwaegen & Onkelinx, 2014; Zahra, 2005). Relative to established exporting exporters, INVs experience greater liabilities of foreignness (Hymer, 1976; Kindleberger, 1969; Zaheer, 1995) but also experience liabilities of newness that contribute to the high rate of their failure (Stinchcombe, 1965). Consequently, INVs need to evade industry competition by overcoming entry barriers such as economies of scale, capital requirements and product differentiations (Robinson & McDougall, 2001) while dealing with those two sets of liabilities (newness and foreignness). As a result, INVs may be exposed to environmental and competitive factors more than established exporting exporters. Successfully navigating these conditions requires time and resources that INVs usually lack. Although new ventures are more flexible and agile as they do not have the same core rigidities, established routines or sunk costs than established exporters (Katila & Shane, 2005; Sapienza et al., 2006; Zimmerman & Zeitz, 2002), INVs are often more vulnerable to technological changes in their environment, adverse industry trends and external shocks as they have not yet acquired a sufficient level of reputation (Diamond, 1989), credibility or collateralizable assets (Berger & Udell, 1998). Clearly, the

environment puts greater pressures on new ventures that lack the legitimacy, resources and track records needed to overcome their well-entrenched competitors (e.g., Carroll & Delacroix, 1982; Singh, Tucker, & House, 1986).

Host-region effects also play a more dominant role on the export behaviors of INVs. When entering and exporting to different regions, firms will be imposed by liabilities of regional foreignness that include entry costs and post-entry uncertainties. Reid (1983: 46) argued "Shipment methods, transportation scheduling and documentation procedures are likely to be market specific and can consume considerable administrative and clerical time." However, even when performance is not satisfactory, INVs will not have to possibilities to readily change logistics and transportation arrangements (Sys, 2009) while established exporters might have more flexibility and experience. Arbitrage opportunities may also exist across regions (Kogut, 1985). However, liabilities of newness and a limited resource base could limit the possibilities of emergence of arbitrage opportunities for INVs (Patel et al., 2018). Limited knowledge and learning routines make it more challenging for INVs to manage different cultural and institutional distances. INVs usually lack strong organizational resources, e.g., diseconomies of time compression (Vermeulen & Barkema, 2002), conflicts between organizational learning and unlearning associated with exposures to different institutions (Autio et al., 2000; Zhou & Guillén, 2015). As such, the complexities for INVs to deal with different regions are higher than for established exporters. Different conditions in a region requires significant early investments by INVs (Hashai, 2011).

Given these observations, we expect that the industry and host-region level factors will explain a larger amount of variance in the export behaviors of INVs compared to established exporting SMEs. Thus,

*Hypothesis 4a. The firm effects will be weaker on the export behaviors of INVs than on the export behaviors of established firms.*

*Hypothesis 4b. The industry effects will be stronger on the export behaviors of INVs than on the export behaviors of established firms.*

*Hypothesis 4c. The host-region effects will be stronger on the export behaviors of INVs than on the export behaviors of established firms.*

## 3 DATA AND METHODS

### 3.1 Sample

We tested our hypotheses on a longitudinal dataset of Belgian SMEs, combining several data sources. First, to develop this database, we used the confidential foreign trade database at the National Bank of Belgium (NBB) that contains detailed export data on all Belgian firms. Foreign trade data are based on customs data for extra-EU trade and the Intrastat inquiry for intra-EU trade. The database includes longitudinal data on each firm's sales in each foreign region outside of Belgium. We classified a region as a grouping of countries with physical proximity and continuity (e.g., Arreggle et al., 2013). The data also includes exporting firms, non-exporting firms and firms that start (or stop) exporting. Second, we used a database that contains detailed annual accounts data for all firms in Belgium from the Central Balance Sheet Office at the NBB. Belgian law requires all firms registered in the country and operate with limited liabilities to shareholders to file their annual accounts. In addition to financial information, Central Balance Sheet Office also provides other firm-level information. For instance, the information on the year of incorporation is used to calculate firm age. Central Balance Sheet Office also assigns firms a four-digit NACE code–the European standard of industry classification–which we used to classify firms within industries. The NACE codes follow the NACE Revision 2 classification.

We first selected Belgian privately held SMEs with available financial accounts between 2006-2014.[4] Our time frame covered periods of economic growth, the global financial crisis of

[4] Firms report customs data (for the extra-EU trade) for all transactions whose value is higher than 1,000 euro. Firms report intra-EU trade by participating in the Intrastat inquiry of the National Bank of Belgium. However,

2008, and subsequent periods of economic decline (Vanacker, Collewaert & Zahra, 2017). We adopted the EU methodology for defining SMEs which are firms employing less than 250 FTE employees and reporting annual turnover less than 50 million euros (and/or annual balance sheet total less than 43 million euros) (European Commission, 2015).[5] The Belgian context is advantageous because it offers detailed and comparable information on the export behaviors of INVs and established exporters which are all privately held. Furthermore, SMEs account for 45% of total exports in Belgium. By focusing only on Belgian firms, we excluded country effects (Bamiatzi et al., 2016).

Second, consistent with prior scholars (e.g., Fernhaber, Gilbert, & McDougall, 2008; Patel et al., 2018), we excluded from our sample firms controlled by an external (foreign) shareholder with an equity stake of 51% or more, and firms owning a foreign subsidiary with an equity stake of 51% or more. We examined exporting at the firm level rather than the division or foreign affiliate levels. Thus, we avoid the challenges that arise when firms' exporting is not only a simple weighted sum of the export behaviors of constituent divisions owing to reporting anomalies, inter-divisional transfer pricing, obfuscation, and the absence of auditing (McGahan & Victer, 2010).

Third, we also excluded certain industries. We excluded utility firms (NACE codes 35-39) which tend to be heavily regulated and largely state-owned. We also excluded financial services firms (NACE codes 64 and 65) as they are not comparable to nonfinancial firms and are usually subject to specific restrictions (Barth, Caprio, & Levine, 2004). We further excluded the government/public sector, education (mainly public sector in Belgium, and even in Europe),

the participation in the Intrastat inquiry is determined by a threshold for exports. Before 2005, firms exporting for at least 250,000 euro a year had to report their export transactions. From 2006 onwards, the threshold for exports was raised to 1,000,000 euro. Firms below the threshold may participate but are not required to do so. To limit the effects of the threshold change on our results, we focus on the financial accounts from 2006 until 2014. However, we collected 2004 and 2005 data to calculate the lagged variables for the initial year of our first-stage linear probability model.

[5] SMEs dominated the business enterprise landscape in Belgium, accounting for 99.9% of all firms in 2015 (OECD, 2019).

the health and social sector (NACE codes 59, 60, 63, 74, 75, 78, 81, 82, 84-88, 90-94, 97, 99) as regulatory issues often drive business decisions among these industries.

Fourth, we required firms to report some basic accounting information (e.g., data on total sales, assets, performance, and employment). This criteria excluded "phantom" firms established for tax purposes (Klapper, Laeven, & Rajan, 2006).

Applying the criteria we have just outlined above resulted in an unbalanced panel (covering the 2006-2014 period) dataset of 43,121 privately held SMEs, representing 169,540 firm-year observations. Some 149,520 of the firm-year observations in our dataset relate to domestic firms (i.e., firm reporting no foreign sales). To test our hypotheses, we focus on the sample of exporting firms, including 4,982 firms, representing 20,020 firm-year observations and active in 54 two-digit NACE code industries. The data on domestic firms is used to control for potential sample selection issues.

Firms that generate a minimum five percent of their sales in foreign markets are defined as exporting SMEs (McDougall, 1989; Zahra et al., 2000). We focused on two types of exporting SMEs, i.e., INVs and established exporters. Consistent with the literature (e.g., Robinson & McDougall, 1998; Shrader et al., 2000; Zahra et al., 2000), we defined INVs as those firms that have foreign sales within six years from their founding. Established exporters are usually seven years or older.[6] Our sample includes 733 INVs, representing 1,443 firm-year observations and active in 46 two-digit NACE code industries, and 4,544 established exporting SMEs, representing 18,577 firm-year observations and active in 52 two-digit NACE code industries.

### 3.2 Dependent variables

[6] When we define established exporters as exporting SMEs of 10 years or older, our results remain robust. As such, using a buffering adolescent period between our definitions of INVs and established exporters did not affect our results.

We focused on SMEs' export behaviors. Exporting–the degree and extent to which a firm sells products or services outside its domestic market (Fernhaber et al., 2008)–is a key path to boost firm growth and profitability (Autio et al., 2000; Lu & Beamish, 2001). Further, it is the initially preferred internationalization method and the most widely used strategy of internationalization (e.g., Agarwal & Ramaswami, 1992; Johanson & Vahlne, 1977; Salomon & Shaver, 2005). Typically, INVs begin their operations by exporting (Cavusgil & Knight, 2015). We used two distinct measures: the export intensity and export diversity.

First, while some exporting SMEs derive a small percentage of their sales from international markets, others derive a large percentage of their sales from these markets. Therefore, firms with a greater dependence on sales from international markets have a higher export intensity than other firms (Fernhaber et al., 2008). We operationalized the level of export intensity as export sales divided by total sales in a given year (e.g., Lu & Beamish, 2001; Sleuwaegen & Onkelinx, 2014; Lee & Weng, 2013).

Second, export diversity refers to the extent to which a firm enters foreign markets outside their home country (Fernhaber et al., 2008). It indicates a firm's choice of market expansion and geographic diversification strategies. We measured export diversity by an export diversity index in a given year by using the following formula: Entropy = $\Sigma$ Pj * ln(1/Pj), where Pj is defined as the percentage of firm foreign sales in a given market j and ln(1/Pj) is the weight given to each market, defined by the natural logarithm of the inverse of their percentage of its firm foreign sales in market j (e.g., Ahuja & Katila, 2001; Paeleman et al., 2017; Palepu, 1985). Foreign markets are classified into four segments representing their geographical and culture distance from the firm's domestic market: five countries bordering Belgium (including the United Kingdom); other countries within the European Union; other European countries and North America; and the rest of the world. As a robustness test, we used an alternative measure

for export diversity measured by the natural logarithm of the number of countries from which a firm generates foreign sales (e.g., Fernhaber et al., 2008; Zahra et al., 2000).

### 3.3 Explanatory factors

Variance decomposition analysis has been used frequently in strategy and management literatures (e.g., Bowman and Helfat, 2001; Brush, Bromiley, & Hendrickx, 1999; McGahan & Porter, 2002; Rumelt, 1991) and more recently in entrepreneurship literature (Fitza et al., 2009; Short et al., 2009). This analysis is used to estimate the proportion of variance in a dependent variable that can be attributed to certain factors called effect-classes. We decompose measures of the variance of exporting behaviors into factors connected with firm, industry, host-region, and year. First, we provided each firm a unique ID code. Second, following the variance decomposition literature, firms were grouped by industry based on four-digit NACE industry codes to allow for testing of industry effects (Short et al., 2006).[7] Third, following prior internationalization literature (Arregle et al., 2013; Patel et al., 2018), we conceptualized regions based on the physical proximity and continuity of the countries in the grouping. Regional groupings based on geographical proximate countries are commonly used (Flores, Aguilera, Mahdian, & Vaaler, 2013), compatible with prior studies (Qian et al., 2010) and, unlike other classifications, rather stable over time (Boehe, 2014). For regional breakdown, we classified countries in eight regions in this study: Europe, Middle East, Africa, Oceania, North America, South America, Asia and other. A detailed overview of the composition of regions is available in Appendix 1. For each region we calculated the ratio export sales to that region scaled by total export sales. Fourth, we indicated a book year for each observation.

Our study does not examine the marginal contribution of specific effect values (e.g., Europe versus Middle East). Rather, we study, for instance, the impact of the host-region effect-class; the extent to which export behaviors (export intensity and diversity) are sensitive to

[7] Our results are robust when using two-digit NACE industry codes.

variation in the host-region where they export to. Thus, for the purpose of our study, the specific values within a given effect-class are irrelevant. Rather, all that matters is whether the dependent variables vary as a function of variation in the effect-class. As a consequence, we estimate the overall impact of each effect-class and does not require fine-grained measures thereof (Dushnitsky & Fitza, 2018).

### 3.4 Descriptive statistics

Table 1 shows that our sample covers a broad range of sub-industries. Panel A includes all exporting SMEs, Panel B includes INVs and Panel C includes established exporters. Table 1 also reports the means and standard deviations of export intensity and export diversity (export diversity index and number of export countries) among the sub-industries for all exporting SMEs, INVs and established exporters.

[Insert Table 1 about here]

### 3.5 Methods

When modeling export intensity and diversity, we only selected those ventures with minimum five percent foreign sales. However, there is a possibility that exporters are not a random subset of all firms but may have certain characteristics that are also linked with export intensity or diversity and have to be taken into account (Ganotakis & Love, 2012). Therefore, we used a two-step procedure to control for this potential sample selection bias and the possibility that entry into exporting is not a random choice (e.g., Greene, 2000; Sui & Baum, 2014; Terjsen, Hessels & Li, 2013). Specifically, we first predicted the probability that firms enter into exporting via a probit model and then controlled for that decision in second-stage regressions (Ganotakis & Love, 2012; Paeleman et al., 2017).[8] The probability of exporting was measured as a dummy variable equal to 1 when a firm has minimum five percent foreign sales in a given year, and 0 otherwise. Following previous scholars (e.g., Hitt, Bierman, Uhlenbruck, &

[8] Results from using a linear probability model are similar to those from a probit model.

Shimizu, 2006; Zahra et al., 1997), we regressed the probability of exporting on the following variables: financial slack, financial slack squared, intangible assets ratio, firm size, firm age, debt ratio, labor productivity, firm performance, firm growth in total assets, legal form, number of firms in the same 4-digit industry, one-period-lagged dependent variable, year and industry dummies. To minimize concerns about reverse causality, we measured the probability to export at time t and the control variables at t-1. We then used this predicted probability of exporting resulting from the first-stage models to create an inverse Mills ratio, which is included as an endogeneity correction in our second stage regressions predicting exporting (Hamilton & Nickerson, 2003; Heckman, 1979).

Earlier variance decomposition studies in strategy research have used a variety of methods to study the degree firm- and industry-level variance matters in firm performance. Recently, the literature (e.g., Bamiatzi et al., 2016; Castellaneta & Gottschalg, 2016; Holcomb et al., 2010; Karniouchina et al., 2013; Short et al., 2007, 2009) has largely relied on multilevel mixed-effects models (Pinheiro & Bates, 2000; Singer & Willett, 2003) also known as random coefficient models or hierarchical linear models (HLM) (Raudenbush & Bryk, 2002). Multilevel mixed-effects models are more flexible and require fewer assumptions than some earlier used methods like variance components analysis (VCA) (e.g., McGahan & Porter, 1997; Bowman & Helfat, 2001; Brush & Bromiley, 1997; Brush et al., 1999), and ANOVA (e.g., Adner & Helfat, 2003, McGahan & Porter, 2002). A weakness of both VCA and ANOVA, however, is that neither fully addresses the structure of panel data (Crossland and Hambrick, 2011). Therefore, multilevel mixed-effects models are frequently used in management research (e.g., Guo, 2017; Misangyi, Elms, Greckhamer, & Lepine, 2006).

The term mixed-effects captures the idea that these models include fixed-effects (the normal regression coefficients) and additionally random effects (the variance components). Modern mixed-effects modeling software does not require the assumptions that the data

structure is hierarchical and can thus flexibly model several variance components simultaneously. One especially useful characteristic of multilevel mixed-effects models is that these techniques can be extended into multi-membership models (MMMs) (Browne, Goldstein, & Rasbash, 2001; Hadfield, 2010). MMMs can accommodate complex nesting structures, like for instance, when a firm operates in multiple host-regions to a certain degree so that the data requires researchers to specify the degree to which the firm is nested in particular host-region through the specification of a weight. In the context of the present study, we used methods that included a total of four different variance components. Firm-, industry-, and host-region level variance which were of primary interest for our research questions and additionally the year effects. The host-region effect is a multi-membership effect because most firms export to multiple regions.

The models we specified included the inverse probability ratio as a control variable and an intercept. We began by fitting models with firm, industry, and year as the respective only variance components, and all three of these variance components simultaneously.

$$\text{Dependent variable}_{ijk} = \gamma_{000} + \pi_{ijk}\text{IMR}_{ijk} + u_{i00} + e_{ijk} \quad \text{(Equation 1)}$$

$$\text{Dependent variable}_{ijk} = \gamma_{000} + \pi_{ijk}\text{IMR}_{ijk} + u_{0j0} + e_{ijk} \quad \text{(Equation 2)}$$

$$\text{Dependent variable}_{ijk} = \gamma_{000} + \pi_{ijk}\text{IMR}_{ijk} + u_{00k} + e_{ijk} \quad \text{(Equation 3)}$$

$$\text{Dependent variable}_{ijk} = \gamma_{000} + \pi_{ijk}\text{IMR}_{ijk} + u_{i00} + u_{0j0} + u_{00k} + e_{ijk} \quad \text{(Equation 4)}$$

where dependent variable$_{ijk}$ represents export intensity (or export diversity) at year *i* for firm *j* in industry *k*, $\gamma_{000}$ is the intercept, $\pi_{ijk}$ represents the fixed effect of the inverse probability ratio, $\text{IMR}_{ijk}$ is the inverse probability ratio at year i for firm j. $u_{i00}$, $u_{0j0}$, and $u_{00k}$ are the deviations for firm, year, and industry. These deviations are assumed to come from a normal distribution with variances $\tau_{i00}$, $\tau_{0j0}$, and $\tau_{00k}$.

$$u_{i00} \overset{iid}{\sim} N(0, \tau_{i00}) \quad \text{(Equation 5)}$$

$$\overset{iid}{}$$

$$u_{0j0} \sim N(0, \tau_{0j0}) \quad \text{(Equation 6)}$$

$$u_{00k} \overset{iid}{\sim} N(0, \tau_{00k}) \quad \text{(Equation 7)}$$

Finally, eijk is the normally distributed residual with variance $\sigma^2$.

$$e_{ijk} \overset{iid}{\sim} N(0, \sigma^2) \quad \text{(Equation 8)}$$

The model shown in equation 4 provides estimations of variance components that partition variance into within-firm (i.e., year-to-year changes in export intensity (or export diversity)), between-firm, and between-industry components. Note that the models shown in equation 1 to 4 are all multilevel mixed-effects models but are not hierarchical in nature as year and firm, as well as year and industry are cross-classified (i.e., year effects generalize across firms, or vice versa, firm and industry effects generalize across years).

Most modern multilevel mixed-effects modeling software can fit these types of models. We nevertheless followed recent research (Castellaneta & Gottschalg, 2016; Guo, 2017; Mollick, 2012) and fitted the model in a Bayesian estimation framework using monte-carlo markov-chain (MCMC) methods (Browne, 2017; Goldstein, 2011; Spiegelhalter, Best, Carlin, & Van Der Linde, 2002). We implemented MCMC methods in the MCMCglmm package for the statistical software environment R.[9] However we checked the results using the very popular lmer function in the lme4 package in R and the estimates were identical. The advantage of MCMC methods for our study was that this approach allowed us to also fit a more complex model that included host-region effects. The challenge of the host-region effects in our dataset was the fact that firms are typically exporting to multiple regions so that host-region was a multi-membership effect that cannot be easily fitted in standard multilevel mixed-effects

[9] More details on the R code in Appendix 2.

software. Accordingly, multiple host-region deviation apply to each firm to varying degrees. This type of model can be written as follows:

$$\text{Dependent variable}_{ijkl} = \gamma_{0000} + \pi_{ijk}\text{IMR}_{ijk} + w_{ijkl}\, u_{000l} \ldots w_{ijkl}\, u_{000l} + e_{ijkl}$$

In this model specification, $u_{000l}$ is the deviation for region l that applies to observation $_{ijkl}$ with weight $w_{ijkl}$. This model can be easily extended by also adding the other variance components discussed earlier. The model uses the same variance specifications mentioned above.

$$\text{Dependent variable}_{ijkl} = \gamma_{0000} + \pi_{ijk}\text{IMR}_{ijk} + u_{i000} + u_{0j00} + u_{00k0} + w1_{ijkl}\, u_{000l} \ldots wx_{ijkl}\, u_{000l} + e_{ijkl}$$

# 4 RESULTS

## 4.1 Findings all exporters

Table 2 show the first-stage regression-predicting selection into exporting. Consistent with prior work (e.g., Autio et al., 2000; Paeleman et al., 2017), the model shows that the variables firm size, debt ratio, labor productivity, firm performance, firm growth in total assets, legal form, and the lagged dependent variable are positively related to a firm's probability to enter into exporting. Firms that are older and are active in industries including a high number of firms are less likely to enter into exporting. Financial slack will positively influence but at a diminishing rate a firm's probability to enter into exporting.

[Insert Table 2 about here]

Table 3, 4 and 5 presents the variance decomposition results for export intensity and export diversity, i.e., weighted score and number of export destinations, respectively. Each model consists of the fixed effects and five variance components: firm effects, industry effects, host-region effects, year effects and the residual variance (also sometimes called the level 1 variance). Models 1 report the results for all exporting SMEs. Models 2 and 3 report the results for the INVs and established exporters, respectively.

[Insert Table 3, 4 and 5 about here]

Model 1 reports findings of the variance decomposition analysis with dependent variable export intensity (Table 3), weighted export diversity score (Table 4) and number of export countries (Table 5). We find that firm, industry, and host-region all explain meaningful variance in export intensity and diversity of all exporting SMEs. The 95% CIs for all effects do not overlap with zero suggesting that the estimates are different from zero. We also further examined how dropping each of these variance components affected the models. For all variance components, dropping the respective component from the model resulted in higher Bayesian deviance information criterion (DIC)s (in Model 1 in Table 3: by at least deltaDIC = 53.03; in Model 1 in Table 4: by at least deltaDIC = 62.68; in Model 1 in Table 5: by at least deltaDIC = 29.82) suggesting decreased model fit (Berg, Meyer, & Yu, 2004).

Model 1 in Table 3 shows that 67.73% (raw variance estimate = 0.0575 [95% CI: 0.0550; 0.0600]) of the variance in export intensity was found at the firm level, 11.37% (raw variance estimate = 0.0097 [95% CI: 0.0071; 0.0123]) of the variance was found at the industry level, and 6.90% (raw variance estimate = 0.0059 [95% CI: 0.0007; 0.0161]) was found at the host-region level. Model 1 in Table 4 shows that 67.60% (raw variance estimate = 0.0783 [95% CI: 0.0749; 0.0818]) of the variance in export diversity measured by the weighted score was found at the firm level, 14.66% (raw variance estimate = 0.0170 [95% CI: 0.0126; 0.0210]) of the variance was found at the industry level, and 4.35% (raw variance estimate = 0.0050 [95% CI: 0.0008; 0.0122]) was found at the host-region level. Model 1 in Table 5 shows that 70.29% (raw variance estimate = 0.5876 [95% CI: 0.5649; 0.6139]) of the variance in number of export countries was found at the firm level, 17.46% (raw variance estimate = 0.1460 [95% CI: 0.1154; 0.1845]) of the variance was found at the industry level, and 4.77% (raw variance estimate = 0.0399 [95% CI: 0.0068; 0.0999]) was found at the host-region level. To conclude, Hypothesis 1, 2 and 3 were fully supported.

**4.2 Findings INVs and established exporters**

To test Hypotheses 4A, B and C and examine differences between INVs and established exporters, we compared variances in both subsamples. Model 2 in Table 3 presents the results for the dependent variable export intensity. We found that firm level effects contributed 58.72% (raw variance estimate = 0.0573 [95% CI: 0.0546; 0.0598]) of variance among INVs versus 71.33% (raw variance estimate = 0.0643 [95% CI: 0.0558; 0.0727]) among established exporters. The CIs for both estimates suggest that firm level explained a substantial amount of variance in both samples. However, we were also interested into differences between INVs and established exporters. To test this idea, we compared the DIC for a model in which the firm level effect is set to be equal across the two subsamples (DIC = -28,352.15) with the model fitted in Model 2 (Table 3) (DIC = -28,446.95). Results revealed that the Bayesian DIC increased (ΔDIC = 114.80) and thus suggested (lower DIC values indicate better fit) that these variance components substantially differed across the two groups of firms (Gelman, Carlin, & Stern, 2004; Hadfield, 2010).

We next examined industry level effects. Model 2 in Table 3 shows that industry level effects contributed 10.20% (raw variance estimate = 0.0099 [95% CI: 0.0074; 0.0128]) of variance among INVs versus 1.37% (raw variance estimate = 0.0012 [95% CI: 0.000004; 0.0055]) among established exporters. This variance component was thus small in both groups of firms. We nevertheless also tested for potential differences between the two groups of firms. Results revealed a lower Bayesian DIC (ΔDIC = -11.64) suggesting that the industry variance components not substantially differed across the two groups of firms.

We also found that host-region level effects contributed 19.71% (raw variance estimate = 0.0192 [95% CI: 0.0013; 0.0558]) of variance among INVs versus 5.91% (raw variance estimate = 0.0053 [95% CI: 0.0008; 0.0147]) among established exporters. DIC comparisons suggested that this difference was substantial (ΔDIC = 28.79).

We followed the same procedure for the models with dependent variable export diversity and found similar results. Model 2 in Table 4 presents the results for the dependent variable export diversity measured by a weighted score. We found that firm level effects contributed 59.58% (raw variance estimate = 0.0783 [95% CI: 0.0744; 0.0816]) of variance among INVs versus 72.74% (raw variance estimate = 0.0779 [95% CI: 0.0673; 0.0882]) among established exporters. DIC comparisons suggested that this difference was substantial (ΔDIC = 111.63). Further, industry level effects contributed 13.50% (raw variance estimate = 0.0177 [95% CI: 0.0135; 0.0223]) of variance among INVs versus 5.67% (raw variance estimate = 0.0061 [95% CI: 0.0005; 0.0143]) among established exporters. This variance component was thus small in both groups of firms. We nevertheless also tested for potential differences between the two groups of firms. Results revealed a lower Bayesian DIC (ΔDIC = -30.79) suggesting that the industry variance components not substantially differed across the two groups of firms. We also found that host-region level effects contributed 15.58% (raw variance estimate = 0.0205 [95% CI: 0.0014; 0.0553]) of variance among INVs versus 3.52% (raw variance estimate = 0.0038 [95% CI: 0.0005; 0.0096]) among established exporters. DIC comparisons suggested that this difference was substantial (ΔDIC = 35.05)

Model 2 in Table 5 presents the results for the dependent variable export diversity measured by the number of export destinations. We found that firm level effects contributed 61.03% (raw variance estimate = 0.5879 [95% CI: 0.5597; 0.6143]) of variance among INVs versus 72.82% (raw variance estimate = 0.5877 [95% CI: 0.5115; 0.6590]) among established exporters. DIC comparisons suggested that this difference was substantial (ΔDIC = 228.97). Further, industry level effects contributed 15.28% (raw variance estimate = 0.1472 [95% CI: 0.1156; 0.1858]) of variance among INVs versus 15.55% (raw variance estimate = 0.1255 [95% CI: 0.0503; 0.2110]) among established exporters. DIC comparisons suggested that this difference was small (ΔDIC = 1.45). We also found that host-region level effects contributed

17.37% (raw variance estimate = 0.1673 [95% CI: 0.0259; 0.4299]) of variance among INVs versus 4.25% (raw variance estimate = 0.0343 [95% CI: 0.0051; 0.0810]) among established exporters. DIC comparisons suggested that this difference was substantial (ΔDIC = 54.90)

To conclude, these results of Models 2 in Table 3, 4 and 5 show that firm effects in INVs are significantly lower than those in established exporters, providing support for hypothesis 4a while host-region effects in INVs are higher than those in established exporters, providing support for hypothesis 4c. While descriptive statistics seemed to support our Hypotheses 4b, model comparisons did not show improved model fit when we assumed differences in industry level effects between the two groups of firms. The sample of firms and the size of this variance component are likely too small to establish a statistically substantially difference in this study. In Table 5, we largely confirmed these results. The DIC of the more complex model was slightly higher for this analysis but the difference was small. Additionally also the differences in the percentages in Table 5 for the industry effects were small. Overall, we thus find limited support for Hypothesis 4b.

### 4.3 Robustness tests

We have carried out additional robustness tests. First, we dropped firms that exported only once (Harris & Li, 2011; Sui & Baum, 2014) to avoid including sporadic exporters with no strategic commitment to the international market. Results remain similar. Second, we dropped firms that started exporting more than once. Again, our results remain similar. Third, when we run our analyses on a sample only including two-way traders (i.e., firms that both export and import), we found similar results.

## 5 CONCLUSION AND DISCUSSION

Using longitudinal data of privately held SMEs active in a broad range of industries, the objective of this study is to make an important contribution to the literature by quantifying the relative importance of firm, industry and host-region effects in explaining export heterogeneity.

We use theoretical lenses at relevant individual levels to develop the basis of our variance decomposition approach. Further, this paper makes the distinction between INVs and established exporters. A finding of a substantial effect provides fundamental insights on whether it is useful to develop theory on firm, industry and host-region characteristics, respectively, that can explain differences in firms' exporting behaviors.

The study adds to the strategy and international entrepreneurship literatures in several ways. First, this study adds new insights to the stream of variance decomposition studies within the strategy literature by focusing on export behaviors. Strategy scholars interested in the firm versus industry effects debate have largely focused on financial performance measures such as profitability, return-on-assets, and other accounting-based measures (Short et al., 2009). Despite the importance of past performance for building the slack resources essential for export behaviors, firms that are doing well domestically may limit their export activities. As such, more work is needed to explore the extent to which firm and industry levels lay at the root of different firm strategies. In this study, we have endeavored to address this gap in the literature by conducting variance decomposition analysis of export behaviors. Due to our focus on export strategy and to justify the attention of a research stream on host-region effects, we also add host-region levels to our models. Overall, this study is among the first to examine the relative impact of firm, industry and host-region level factors shaping export behaviors which is a major dimension of the ongoing strategy process of most firms (e.g., Melin, 1992).

Second, we address calls of strategy scholars to recognize and fully capitalize on longitudinal data that are multilevel in nature (Certo, Withers, & Semadeni, 2017; Guo, 2017). We specifically use longitudinal data of privately held SMEs. Access to detailed longitudinal exporting data of privately held SMEs including the host-regions where firms export to is rare. Moreover, using such data has introduced some extra challenges. Recent publications in strategic management have demonstrated that longitudinal multilevel models are a useful tool

to understand the impact of time and context of organizations (e.g., Guo, 2017; Misangyi et al., 2006). The main advantage of this technique is that it can contribute to a deeper understanding of these factors in real performance and outcome data because it can disentangle competing information and evidence. In this study, we did not only use multilevel techniques but extended this technique to multiple membership cross-classified multilevel models which is particularly challenging to conduct but has the benefit that weights known from previous data can be taken into account. Such multiple membership cross-classified multilevel models (MMMs) have, to the best of our knowledge, rarely been used in strategic management research (exceptions are Castellaneta & Gottschalg, 2016; Guo, 2017; Mollick, 2012), although encompassing both the conditions of multi-membership and cross-classified data. This technique allowed us to take into account host-region effects as firms can export to multiple regions at the same time. Using more detailed longitudinal data including different effects levels demands for more complex methodologies than currently used in strategy literature to fully capture the characteristics of some observations in the data.

Our results indicate that variation in firm effects, industry effects, and host-region effects account for 67.73%, 11.37%, and 6.90%, respectively of the aggregate variance in export intensity. We also find that firm effects, industry effects and host-region effects account for 67.60%, 14.66%, and 4.35%, respectively of the aggregate variance in export diversity measured by a weighted score and 70.29%, 17.46%, and 4.77%, respectively of the aggregate variance in export diversity measured by the number of export countries. As such, on average, our results show that firm effects were the most important determinant of SMEs' export behaviors, followed by the industry effects and host-region effects. Year effects account for the smallest variation in firms' exporting (0.57% for export intensity and 0.33% (0.03%) for export diversity measured by a weighted score (the number of export countries), this may provide support to the concept of exporting as a pattern. Once a firm exports, whether it is immediately

after founding or in later stages, whether it is followed by competitors or unique, and whether it is deliberate or emergent, export behaviors may tend to be maintained over time. Future research should further explore this issue.

Further, while most of the variance decomposition studies in strategy literature focus on publicly traded firms (e.g., Chang & Singh, 2000; Fitza et al, 2009; McGahan & Porter, 1997, 2002) or multinational firms (e.g., Makino et al., 2004; Tong et al., 2008), we focus on a privately held SMEs. We respond to calls to explore data on privately held firms which are more representative of their nations' entire economies (Fitza & Tihanyi, 2017; McGahan & Porter, 2002). Further, Fitza and Tihanyi (2017) show that firm and industry factors affect firm *performance* differently depending on ownership form; i.e., public versus private firms. In fact, they found that, for firm performance, privately held firms registered the smallest industry effects of 2.8% while publicly listed firms registered an industry effect of 8.2%. Privately held firms showed the largest firm effect of 41.2%, while the firm effect was 38.3% for all public firms. However, it is interesting to note that within a privately held context of SMEs, we found that, firm and industry effects both explain a substantial share of the variance in *export* behaviors. Thus, even though industry effects may account for a small portion of the variance in firm performance in privately held firms (Fitza & Tihanyi, 2017), our results reiterate the importance of industry factors in the variance of export behaviors of privately held SMEs.

Third, we enrich the international entrepreneurship literature by providing a first systematic empirical examination of the relative contribution of firm, industry and host-region level drivers in shaping SMEs' export behavior. We conducted a variance decomposition analysis of export behaviors. Exploring the impact of relative variance explained by each of the factors can meaningfully contribute to international entrepreneurship research and also provide managers with a meaningful understanding of factors driving export behaviors. Further, we examined whether industry and host-region effects matter relative more for export behaviors of

INVs compared to established exporters, and whether firm effects matter relative more for export behaviors of established exporters compared to INVs. Our results show that firms effects are more important in established exporters than in INVs while host-region effects are more important in INVs than in established exporters. Although research on how host-regions where INVs export to can impact their exporting strategy is rare, our results stress the importance of the impact of regional conditions on the exporting behaviors of INVs and demonstrates that host-region effects need to be better integrated into the existing theoretical and conceptual frameworks. Managers' decisions regarding which host-region to compete in should be brought to the forefront of the new venture export process. Examples of host-region factors might include geographical, institutional, cultural, regulatory, cognitive and economic differences. As the goal of this study is to describe the variance in export behaviors without any claim about underlying causal relationships, future scholars should further explore in detail host-region characteristics that could influence INVs' export behaviors. Interestingly, although past research refers to the important role of industry on new venture internationalization (Bloodgood et al., 1996; Shrader et al., 2000), few studies have specifically examined this relationship (Fernhaber et al., 2007). Our findings do not support the idea that industry matters more for INVs than established exporters.

Next, the variance decomposition literature has mainly focused on large, established firms while overlooking new ventures, with the notable exception of Short et al. (2009) examining firm and industry effects on the performance of new ventures. By examining a population of Swedish firms, they show that industry level 'matters' little for the *survival* of both new ventures and established firms while industry effects are almost twice as large in terms of *sales and sales growth* for established firms as compared to new ventures. Our results advance these arguments that industry effects 'matters' for export behaviors of new ventures but it 'matters' less compared to firm and host-region effects. Further, our results show no

substantial differences in industry effects between INVs and established exporters. The last finding supports the call of more variance decomposition research focusing on differences between groups (Hawawini et al., 2003; Short et al., 2009) and illustrates the importance of conducting a variance decomposition analysis of specific firm strategies as differences might be present with conducting a variance decomposition analysis of performance measures in general but not when focusing on particular firm strategies.

### 5.1 Managerial implications

Our results indicate the existence of intriguing differences in the motivations of INVs and established exporters in pursuing exporting activities. Examining firm, industry and host-region effects provide valuable insights in this regard. As the firm level variables play the dominant role in explaining exporting differences among SMEs, managers should pay attention to understanding these variables. The resource-, capability- and knowledge-based views all suggest that internal organizational factors shape firms' decisions to export and engage in other international activities. Still, our study also shows that INVs' managers should pay more attention to the choice of the host-region in which to compete given that host-region factors plays a more important role in shaping these ventures' export behaviors.

### 5.2 Limitations and future research directions

Despite its contributions, our study has several limitations that both define the boundaries of its insights and provide opportunities for future research. First, a small subset of scholars have recognized the significant impact of home country effects on the performance of multinationals (Brouthers, 1998; Yip, 1991) or on the foreign affiliates' performance of these multinationals (Makino et al., 2004). Future research should further explore the home country effects as an additional determinant of firm export behaviors, especially among privately held firms hosted in different countries as national contextual factors might influence these firms' behaviors. As we only focus on firms originated in a single home country, namely Belgium, we disregard

country of origin characteristics. However, we encourage future scholars to use multi-country samples to further increase the generalizability of our results and explore home country effects. Studies focusing on larger countries, for instance the United States, can also explore home-regions effects to detect different agglomeration economies. However, for our sample, scholars have indicated that Belgium is a regional integration bloc (Knight & Liesch, 2016).

Variance decomposition studies in strategy literature do not examine why there is variation in firm performance across different levels of observations rather they show how much each level of effect can explain the variation in the outcome variable (Makino et al., 2004). This study focuses on partitioning variance in export behaviors, but not on explaining it. Future research should rely on this partitioning as it provides the basis for identifying what industry, firm and host-region attributes explain the variance at each level. This study shows, for instance, that host-region effects play a bigger role for INVs relative to established exporters. However, prior scholars have largely neglected the effects of variables related to organizational environment and context that may influence INVs (Fernhaber et al., 2007; Knight & Leisch, 2016). Therefore, future research should focus on what factors in the firm's (potential) host-regions will advance or constrain INVs' export behaviors. Further, given that both firm, industry and host-region level effects are multifaceted, it would be beneficial to identify relevant subsets under each level and determine their contributions to explaining variance in export behaviors.

Further, although exporting is a relatively straightforward way of entering foreign markets (e.g., Baum et al., 2015; Cavusgil & Knight, 2015; Johanson & Vahlne, 1977; Leonidou & Katsikeas, 1996; Sui, Baum, Malhotra, 2019), it is only one mode of entry into foreign markets. Future studies can explore the relative effects of firm, industry and host-region for other types of entry modes such as foreign direct investment or other firm strategies such as firm innovation or firm acquisitions which have to be undertaken to enhance firms' competitive

position and achieve superior performance. Similarly, given that firms often pursue multiple goals through internationalization, future researchers need to consider multiple performance criteria such as financial vs. market performance, market position, and competitive standing.

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**Table 1** Description of sample characteristics

| | Panel A: All exporting SMEs (N = 20,020) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number of two-digit NACE codes in sample | Number of firm-year observations | % | Mean export intensity | S.D. export intensity | Mean export diversity (weighed score) | S.D. export diversity (weighed score) | Mean export diversity (number of export destinations) | S.D. export diversity (number of export destinations) |
| Agriculture, forestry and fishing | 3 | 256 | 1.28 | 0.53 | 0.28 | 0.65 | 0.31 | 7.18 | 8.36 |
| Mining and quarrying | 2 | 60 | 0.30 | 0.37 | 0.20 | 0.48 | 0.13 | 3.40 | 3.15 |
| Manufacturing | 23 | 9,346 | 46.68 | 0.48 | 0.28 | 0.72 | 0.35 | 15.94 | 14.94 |
| Construction | 3 | 283 | 1.41 | 0.31 | 0.24 | 0.49 | 0.29 | 8.01 | 9.32 |
| Wholesale and retail trade; repair of motor vehicles and motorcycles | 3 | 9233 | 46.12 | 0.39 | 0.27 | 0.58 | 0.31 | 12.73 | 12.27 |
| Transportation and storage | 4 | 278 | 1.39 | 0.44 | 0.35 | 0.63 | 0.44 | 16.63 | 22.38 |
| Accommodation and food service activities | 2 | 34 | 0.17 | 0.24 | 0.20 | 0.39 | 0.21 | 4.94 | 4.11 |
| Information and communication | 3 | 201 | 1.00 | 0.34 | 0.26 | 0.56 | 0.38 | 12.55 | 12.55 |
| Financial and insurance activities | 1 | 1 | 0.00 | 0.15 | - | 0.36 | - | 9.00 | - |
| Real estate activities | 1 | 49 | 0.24 | 0.42 | 0.28 | 0.61 | 0.32 | 11.73 | 11.19 |
| Professional, scientific and | 5 | 210 | 1.05 | 0.38 | 0.26 | 0.61 | 0.33 | 14.88 | 16.26 |
| Administrative and support service activities | 2 | 44 | 0.22 | 0.18 | 0.17 | 0.36 | 0.18 | 9.80 | 7.62 |
| Other service activities | 2 | 25 | 0.12 | 0.40 | 0.42 | 0.54 | 0.44 | 5.48 | 4.02 |
| *Total* | *54* | *20,020* | *99.98* | *0.43* | *0.28* | *0.64* | *0.34* | *14.11* | *13.85* |

| | Panel B: INVs (N = 1,443) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number of two-digit NACE codes in sample | Number of firm-year observations | % | Mean export intensity | S.D. export intensity | Mean export diversity (weighed score) | S.D. export diversity (weighed score) | Mean export diversity (number of export destinations) | S.D. export diversity (number of export destinations) |
| Agriculture, forestry and fishing | 3 | 34 | 2.36 | 0.66 | 0.27 | 0.82 | 0.33 | 11.12 | 13.38 |
| Mining and quarrying | 1 | 1 | 0.07 | 0.34 | - | 0.47 | - | 3.00 | - |
| Manufacturing | 22 | 461 | 31.95 | 0.52 | 0.29 | 0.72 | 0.35 | 13.89 | 15.43 |
| Construction | 2 | 21 | 1.46 | 0.40 | 0.35 | 0.56 | 0.44 | 10.90 | 16.46 |
| Wholesale and retail trade; repair of motor vehicles and motorcycles | 3 | 811 | 56.20 | 0.45 | 0.30 | 0.63 | 0.33 | 11.44 | 11.00 |
| Transportation and storage | 3 | 32 | 2.22 | 0.51 | 0.40 | 0.72 | 0.46 | 14.00 | 16.02 |
| Accommodation and food service activities | 2 | 3 | 0.21 | 0.18 | 0.18 | 0.36 | 0.28 | 3.00 | 0.00 |
| Information and communication | 3 | 36 | 2.49 | 0.38 | 0.26 | 0.63 | 0.33 | 13.75 | 13.19 |
| Financial and insurance activities | | | | | | | | | |
| Real estate activities | | | | | | | | | |
| Professional, scientific and | 4 | 39 | 2.70 | 0.36 | 0.28 | 0.59 | 0.33 | 12.26 | 12.41 |
| Administrative and support service activities | 1 | 1 | 0.07 | 0.16 | - | 0.34 | - | 5.00 | - |
| Other service activities | 2 | 4 | 0.28 | 0.07 | 0.02 | 0.20 | 0.04 | 7.00 | 6.38 |
| *Total* | *46* | *1,443* | *100.00* | *0.47* | *0.30* | *0.66* | *0.35* | *12.30* | *12.94* |

| Panel C: Established exporters (N = 18,577) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number of two-digit NACE codes in sample | Number of firm-year observations | % | Mean export intensity | S.D. export intensity | Mean export diversity (weighed score) | S.D. export diversity (weighed score) | Mean export diversity (number of export destinations) | S.D. export diversity (number of export destinations) |
| Agriculture, forestry and fishing | 3 | 222 | 1.20 | 0.51 | 0.28 | 0.63 | 0.31 | 6.58 | 7.15 |
| Mining and quarrying | 1 | 59 | 0.32 | 0.37 | 0.20 | 0.48 | 0.14 | 3.41 | 3.18 |
| Manufacturing | 23 | 8,885 | 47.83 | 0.48 | 0.28 | 0.71 | 0.35 | 16.05 | 14.91 |
| Construction | 3 | 262 | 1.41 | 0.30 | 0.23 | 0.49 | 0.28 | 7.78 | 8.51 |
| Wholesale and retail trade; repair of motor vehicles and motorcycles | 3 | 8,422 | 45.34 | 0.38 | 0.27 | 0.57 | 0.31 | 12.85 | 12.38 |
| Transportation and storage | 4 | 246 | 1.32 | 0.43 | 0.34 | 0.62 | 0.44 | 16.98 | 23.08 |
| Accommodation and food service activities | 2 | 31 | 0.17 | 0.24 | 0.20 | 0.39 | 0.21 | 5.13 | 4.26 |
| Information and communication | 3 | 165 | 0.89 | 0.33 | 0.25 | 0.55 | 0.38 | 12.29 | 12.43 |
| Financial and insurance activities | 1 | 1 | 0.01 | 0.15 | - | 0.36 | - | 9.00 | - |
| Real estate activities | 1 | 49 | 0.26 | 0.42 | 0.28 | 0.61 | 0.32 | 11.73 | 11.19 |
| Professional, scientific and | 5 | 171 | 0.92 | 0.38 | 0.26 | 0.62 | 0.33 | 15.47 | 16.99 |
| Administrative and support service activities | 2 | 43 | 0.23 | 0.18 | 0.17 | 0.36 | 0.19 | 9.91 | 7.68 |
| Other service activities | 1 | 21 | 0.11 | 0.46 | 0.43 | 0.60 | 0.46 | 5.19 | 3.57 |
| *Total* | *52* | *18,577* | *100.00* | *0.43* | *0.28* | *0.64* | *0.34* | *14.25* | *13.91* |

**Table 2** First-stage regression results

| Variables | |
|---|---|
| Financial slack | 0.187 [0.064] |
| | (0.101) |
| Financial slack squared | -0.683 [0.001] |
| | (0.212) |
| Intangible assets ratio | 0.050 [0.737] |
| | (0.150) |
| Firm size | 0.179 [0.000] |
| | (0.007) |
| Firm age | -0.052 [0.000] |
| | (0.012) |
| Debt ratio | 0.048 [0.056] |
| | (0.025) |
| Labor productivity | 0.000 [0.061] |
| | (0.000) |
| Firm performance | 0.153 [0.031] |
| | (0.071) |
| Firm growth in total assets | 0.121 [0.000] |
| | (0.019) |
| Legal form | 0.106 [0.000] |
| | (0.019) |
| Number of firms in same 4-digit industry | -0.041 [0.000] |
| | (0.007) |
| Lagged dependent variable | 3.118 [0.000] |
| | (0.023) |
| Constant | -4.945 [0.000] |
| | (0.135) |
| Year fixed effects? | Yes |
| Industry fixed effects? | Yes |
| | |
| Number of firm year observations | 169,540 |
| Number of firms | 43,121 |
| Log Likelihood | -14,150 |

*Note:* Unstandardized regression coefficients are reported. Robust standard errors are in parentheses. The p-values are between square brackets. Two-tailed tests.

**Table 3** MCMC estimation results for dependent variable export intensity

| | ***Model 1*** | | | ***Model 2*** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***All exporting SMEs*** | | | ***INVs (age < 7y)*** | | | ***Established exporters (age >6y)*** | | |
| *FIXED EFFECTS* | | | | | | | | | |
| | Coef. [95%CI] | | | Coef. [95%CI] | | | Coef. [95%CI] | | |
| Intercept | 0.3568 [0.2989;0.4223] | | | 0.3555 [0.2935;0.4088] | | | 0.4012 [0.2978;0.5290] | | |
| IMR | -0.0325 [-0.0365;-0.0291] | | | -0.0322 [-0.0357;-0.0280] | | | | | |
| *RANDOM EFFECTS* | | | | | | | | | |
| Intercept | Variance | [95%CI] | % of total | Variance | [95%CI] | % | Variance | [95%CI] | % of total |
| Firm | 0.0575 | [0.0550;0.0600] | 67.73% | 0.0573 | [0.0546;0.0598] | 58.72% | 0.0643 | [0.0558;0.0727] | 71.33% |
| Industry | 0.0097 | [0.0071;0.0123] | 11.37% | 0.0099 | [0.0074;0.0128] | 10.20% | 0.0012 | [3.58e-06;0.0055] | 1.37% |
| Host-region | 0.0059 | [0.0007;0.0161] | 6.90% | 0.0192 | [0.0013;0.0558] | 19.71% | 0.0053 | [0.0008;0.0147] | 5.91% |
| Year | 0.0005 | [0.0001;0.0011] | 0.57% | 0.0004 | [0.0001;0.0010] | 0.46% | 0.0005 | [1.97e-13;0.0019] | 0.56% |
| Residual | 0.0114 | [0.0112;0.0116] | 13.42% | 0.0106 | [0.0104;0.0109] | 10.90% | 0.0188 | [0.0167;0.0207] | 20.82% |
| Total variance | 0.0849 | | 100.00% | 0.0975 | | 100.00% | 0.0902 | | 100.00% |
| DIC | -28,159.15 | | | -28,446.95 | | | | | |
| Nmbr of firms | 4,982 | | | 733 | | | 4,544 | | |
| Nmbr of obs | 20,020 | | | 1,443 | | | 18,577 | | |

Note: [a] To determine differences between INVs and established exporters, we were also interested in the degree to which differences in single variance components contributed to model fit. Setting the variance component for firm level, industry level, and host-region level equal across the two subsamples in Model 2 resulted in DICs of -28,352.15, -28,478.59, and -28,438.16, respectively.

**Table 4** MCMC estimation results for dependent variable export diversity (weighted score)

| | ***Model 1*** | | | ***Model 2*** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***All exporting SMEs*** | | | ***INVs (age < 7y)*** | | | ***Established exporters (age >6y)*** | | |
| *FIXED EFFECTS* | | | | | | | | | |
| | Coef. [95%CI] | | | Coef. [95%CI] | | | Coef. [95%CI] | | |
| Intercept | 0.5713 [0.5170;0.6335] | | | 0.5781 [0.5182;0.6260] | | | 0.5837 [0.4553;0.7030] | | |
| IMR | -0.0435 [-0.0478;-0.0388] | | | -0.0439 [-0.0483;-0.0395] | | | | | |
| *RANDOM EFFECTS* | | | | | | | | | |
| Intercept | Variance | [95%CI] | % of total | Variance | [95%CI] | % | Variance | [95%CI] | % of total |
| Firm | 0.0783 | [0.0749;0.0818] | 67.60% | 0.0783 | [0.0744;0.0816] | 59.58% | 0.0779 | [0.0673;0.0882] | 72.74% |
| Industry | 0.0170 | [0.0126;0.0210] | 14.66% | 0.0177 | [0.0135;0.0223] | 13.50% | 0.0061 | [0.0005;0.0143] | 5.67% |
| Host-region | 0.0050 | [0.0008;0.0122] | 4.35% | 0.0205 | [0.0014;0.0553] | 15.58% | 0.0038 | [0.0005;0.0096] | 3.52% |
| Year | 0.0004 | [0.0001;0.0009] | 0.33% | 0.0003 | [0.0001;0.0008] | 0.26% | 0.0006 | [9.88e-17;0.0024] | 0.52% |
| Residual | 0.0151 | [0.0148;0.0155] | 13.06% | 0.0146 | [0.0142;0.0149] | 11.08% | 0.0188 | [0.0166;0.0206] | 17.55% |
| Total variance | 0.1159 | | 100.00% | 0.1314 | | 100.00% | 0.1071 | | 100.00% |
| DIC | -22,477.99 | | | -22,614.58 | | | | | |
| Nmbr of firms | 4,982 | | | 733 | | | 4,544 | | |
| Nmbr of obs | 20,020 | | | 1,443 | | | 18,577 | | |

Note: [b] To determine differences between INVs and established exporters, we were also interested in the degree to which differences in single variance components contributed to model fit. Setting the variance component for firm level, industry level, and host-region level equal across the two subsamples in Model 2 resulted in DICs of -22,502.95, -22,645.37, and -22,579.53 respectively.

**Table 5** MCMC estimation results for dependent variable export diversity (number of export countries)

| | ***Model 1*** | | | ***Model 2*** | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***All exporting SMEs*** | | | ***INVs (age < 7y)*** | | | ***Established exporters (age >6y)*** | | |
| *FIXED EFFECTS* | | | | | | | | | |
| | Coef. [95%CI] | | | Coef. [95%CI] | | | Coef. [95%CI] | | |
| Intercept | 2.0445 [1.8837;2.1997] | | | 2.0705 [1.9099;2.2102] | | | 1.9114 [1.5864;2.2223] | | |
| IMR | -0.0918 [-0.1021;-0.0836] | | | -0.0929 [-0.1023;-0.0836] | | | | | |
| *RANDOM EFFECTS* | | | | | | | | | |
| Intercept | Variance | [95%CI] | % of total | Variance | [95%CI] | % | Variance | [95%CI] | % of total |
| Firm | 0.5876 | [0.5649;0.6139] | 70.29% | 0.5879 | [0.5597;0.6143] | 61.03% | 0.5877 | [0.5115;0.6590] | 72.82% |
| Industry | 0.1460 | [0.1154;0.1845] | 17.46% | 0.1472 | [0.1156;0.1858] | 15.28% | 0.1255 | [0.0503;0.2110] | 15.55% |
| Host-region | 0.0399 | [0.0068;0.0999] | 4.77% | 0.1673 | [0.0259;0.4299] | 17.37% | 0.0343 | [0.0051;0.0810] | 4.25% |
| Year | 0.0003 | [0.0001;0.0007] | 0.03% | 0.0003 | [2.55e-05;0.0007] | 0.03% | 0.0000 | [1.48e-17;5.57e-07] | 0.00% |
| Residual | 0.0622 | [0.0608;0.0635] | 7.44% | 0.0605 | [0.0592;0.0621] | 6.28% | 0.0595 | [0.0536;0.0654] | 7.37% |
| Total variance | 0.8360 | | 100.00% | 0.9632 | | 100.00% | 0.8070 | | 100.00% |
| DIC | 6,000.67 | | | 5,691.23 | | | | | |
| Nmbr of firms | 4,982 | | | 733 | | | 4,544 | | |
| Nmbr of obs | 20,020 | | | 1,443 | | | 18,577 | | |

Note: [c] To determine differences between INVs and established exporters, we were also interested in the degree to which differences in single variance components contributed to model fit. Setting the variance component for firm level, industry level, and host-region level equal across the two subsamples in Model 2 resulted in DICs of 5,920.19, 5,692.67, and 5,746.13 respectively.

**Appendix 1.** Composition of regions

| Regions | Countries | Regions | Countries |
|---|---|---|---|
| *Europe* | Albania | *Europe* | Montenegro |
| | Andorra | | Netherlands |
| | Armenia | | Norway |
| | Austria | | Poland |
| | Azerbaijan | | Portugal |
| | Belarus | | Reunion |
| | Belgium | | Réunion (La) |
| | Bonaire, Sint Eustatius and Saba | | Romania |
| | Bosnia and Herzegovina | | Russian Federation |
| | Bulgaria | | Saint Barthélemy |
| | Canary Islands | | San Marino |
| | Ceuta | | Serbia |
| | Croatia | | Sint Maarten (Dutch part) |
| | Curaçao | | Slovakia |
| | Cyprus | | Slovenia |
| | Czech Republic | | Spain |
| | Denmark | | St Pierre and Miquelon |
| | Estonia | | Svalbard |
| | Faroe Islands | | Svalbard & Jan Mayen (îles) |
| | Finland | | Sweden |
| | Former Yugoslav Republic of Macedonia | | Switzerland |
| | France | | Turkey |
| | French Guyana | | Ukraine |
| | Georgia | | United Kingdom |
| | Germany | | Yugoslavia |
| | Gibraltar | | [1] Former Yugoslav Republic of Macedonia |
| | Greece | | |
| | Guadeloupe | *Middle* | Bahrain |
| | Guernesey | | Iran, Islamic Republic of |
| | Guyane française | | Iraq |
| | Holy See (Vatican City State) | | Israel |
| | Hungary | | Jordan |
| | Iceland | | Kuwait |
| | Ireland | | Lebanon |
| | Italy | | Occupied Palestinian Territory |
| | Jersey | | Oman |
| | Kazakhstan | | Qatar |
| | Kosovo | | Saudi Arabia |
| | Latvia | | Syrian Arab Republic |
| | Liechtenstein | | Tajikistan |
| | Lithuania | | Turkmenistan |
| | Luxembourg | | United Arab Emirates |
| | Malta | | Uzbekistan |
| | Man (île de) | | West Bank and Gaza Strip |
| | Martinique | | Yemen |
| | Melilla | | |
| | Moldova, Republic of | | |

Appendix 1. Composition of regions (to be continued)

| Regions | Countries | Regions | Countries |
|---|---|---|---|
| *Africa* | Algeria | *Africa* | Swaziland |
| | Angola | | Tanzania |
| | Benin | | Togo |
| | Botswana | | Tunisia |
| | Burkina Faso | | Uganda |
| | Burundi | | Western Sahara |
| | Cameroon | | Zambia |
| | Cape Verde | | Zimbabwe |
| | Central African Republic | | |
| | Chad | *Oceania* | American Oceania |
| | Comoros | | American Samoa |
| | Congo | | Australia |
| | Côte d'Ivoire | | Australian Oceania |
| | Djibouti | | Cook Islands |
| | Egypt | | Fiji |
| | Equatorial Guinea | | French Polynesia |
| | Eritrea | | French Southern Territories |
| | Ethiopia | | Guam |
| | Gabon | | Kiribati |
| | Gambia | | Marshall Islands |
| | Ghana | | Micronesia |
| | Guinea | | Nauru |
| | Kenya | | New Caledonia |
| | Lesotho | | New Zealand |
| | Liberia | | Niue |
| | Madagascar | | Norfolk Island |
| | Malawi | | Northern Mariana Islands |
| | Mali | | Palau |
| | Mauritania | | Papua New Guinea |
| | Mauritius | | Pitcairn |
| | Mayotte Grande-Terre and Pamandzi | | Samoa |
| | Morocco | | Solomon Islands |
| | Mozambique | | Tokelau |
| | Namibia | | Tonga |
| | Niger | | Tuvalu |
| | Nigeria | | United States Minor Outlying Islands |
| | Rwanda | | Vanuatu |
| | Sahara occidental | | Wallis and Futuna |
| | Saint Helena | | |
| | Sao Tome and Principe | | |
| | Senegal | | |
| | Seychelles | | |
| | Sierra Leone | | |
| | Somalia | | |
| | South Africa | | |
| | South Sudan | | |
| | Sudan | | |

Appendix 1. Composition of regions (to be continued)

| Regions | Countries | Regions | Countries |
|---|---|---|---|
| *North America* | Canada | *Asia* | Afghanistan |
| | Puerto Rico (=U.S.A.) | | Bangladesh |
| | United States | | Bhutan |
| | | | British Indian Ocean Territory |
| *South America* | Anguilla | | Brunei Darussalam |
| | Antigua and Barbuda | | Cambodia |
| | Argentina | | China |
| | Aruba | | Christmas Island |
| | Bahamas | | Cocos Islands (or Keeling Islands) |
| | Barbados | | East Timor |
| | Belize | | Guyana |
| | Bermuda | | Hong Kong |
| | Bolivia | | India |
| | Brazil | | Indonesia |
| | Cayman Islands | | Japan |
| | Chile | | Korea, Democratic People's Republic of |
| | Colombia | | Korea, Republic of (South Korea) |
| | Costa Rica | | Kyrgyz, Republic |
| | Cuba | | Lao People's Democratic Republic |
| | Dominican Republic | | Macao |
| | Ecuador | | Malaysia |
| | El Salvador | | Maldives |
| | Falkland Islands | | Mongolia |
| | Grenada | | Myanmar |
| | Guadeloupe | | Nepal |
| | Guatemala | | Pakistan |
| | Haiti | | Philippines |
| | Honduras | | Singapore |
| | Jamaica | | Sri Lanka |
| | Mexico | | Taiwan |
| | Montserrat | | Thailand |
| | Netherlands Antilles | | Timor-Leste |
| | Nicaragua | | Vietnam |
| | Panama (zone du canal) | | |
| | Paraguay | *Other* | Antarctica |
| | Peru | | Bouvet Island |
| | Porto-Rico | | Greenland |
| | St Kitts and Nevis | | Heard Island and McDonald Islands |
| | St Lucia | | High sea |
| | St Vincent and the Grenadines | | Polar regions |
| | Suriname | | South Georgia and South Sandwich |
| | Trinidad and Tobago | | |
| | Turks and Caicos Islands | | |
| | Uruguay | | |
| | Venezuela | | |
| | Virgin Islands, British | | |
| | Virgin Islands, United States | | |

**Appendix 2.** MCMC code in R

List of variables:

| ***Variables*** | ***Definition*** |
|---|---|
| Export intensity | Export sales divided by total sales |
| IMR | Inverse Mills Ratio |
| ID code | Firm effects: We provide each firm a unique ID code. |
| NACE industry code | Industry effects: Firms were grouped by industry based on four-digit NACE industry code. |
| weight_europe + weight_middle + weight_africa + weight_oceania + weight_northam + weight_southam + weight_asia + weight_others | Host-region effects: For regional breakdown, we classified countries in eight regions: Europe, Middle East, Africa, Oceania, North America, South America, Asia and other. For each region we calculated the ratio export sales to that region scaled by total export sales. |
| YEAR code | Year effects: for each observation we indicate the book year. |

**MCMCglmm with dependent variable export intensity: all exporters**

```
m1mcmc<-MCMCglmm(export intensity~1 + IMR, random=~ ID code + NACE
industry code + YEAR code
+idv(~weight_europe+weight_africa+weight_asia+weight_middle+weight_northam+
weight_southam+weight_oceania+weight_others), data= dataset,
family="gaussian",nitt=5e3,burnin=1e3,thin=5)
```

We tested for all variance components, if dropping the respective component from the model resulted in higher Bayesian DICs. When dropping any random effect increases DIC, all random effects are supported even though their impact varies a lot.

```
m1mcmc_noNACEindustrycode<-MCMCglmm(export intensity ~1 +  IMR,
random=~ ID code + YEAR code
+idv(~weight_europe+weight_africa+weight_asia+weight_middle+weight_northam+
weight_southam+weight_oceania+weight_others), data= dataset,
family="gaussian",nitt=5e3,burnin=1e3,thin=5)

m1mcmc_noIDcode <-MCMCglmm(export intensity ~1 +  IMR,  random=~ NACE
industry code + YEAR code
+idv(~weight_europe+weight_africa+weight_asia+weight_middle+weight_northam+
weight_southam+weight_oceania+weight_others), data= dataset,
family="gaussian",nitt=5e3,burnin=1e3,thin=5)

m1mcmc_noYEARcode<-MCMCglmm(export intensity ~1 + IMR,  random=~ ID
code + NACE industry code
+idv(~weight_europe+weight_africa+weight_asia+weight_middle+weight_northam+
weight_southam+weight_oceania+weight_others), data= dataset,
family="gaussian",nitt=5e3,burnin=1e3,thin=5)
```

m1mcmc_noREG<-MCMCglmm(export intensity ~1 + IMR, random=~ ID code + NACE industry code + YEAR code, data= dataset, family="gaussian",nitt=5e3,burnin=1e3,thin=5)

m1mcmc$DIC

m1mcmc_noNACEindustrycode$DIC

m1mcmc_noIDcode$DIC

m1mcmc_noYEARcode$DIC

m1mcmc_noREG$DIC

**MCMCglmm with dependent variable export intensity: INVs versus established exporters**

dataset$dummy<-as.factor(ifelse(dataset$age<7& dataset$export intensity>0.05, 1, ifelse(dataset$age>6&dataset$export intensity>0.05,0,NA)))

dataset<- dataset[is.na(rbank2$dummy)==F,]

dataset$dummy0<-ifelse(dataset$dummy==1,1,0)

dataset$dummy1<-ifelse(dataset$dummy==0,1,0)

m1bmcmc<-MCMCglmm(export intensity ~1 + IMR + dummy-1, random=~idh(dummy): ID code + idh(dummy): NACE industry code +idh(dummy): YEAR code +idv(~weight_europe:dummy1+weight_africa:dummy1+weight_asia:dummy1+weight_middle:dummy1+weight_northam:dummy1+weight_southam:dummy1+weight_oceania:dummy1+weight_others:dummy1)+idv(~weight_europe:dummy0+weight_africa:dummy0+weight_asia:dummy0+weight_middle:dummy0+weight_northam:dummy0+weight_southam:dummy0+weight_oceania:dummy0+weight_others:dummy0),rcov=~idh(dummy):units, data= dataset, family="gaussian",nitt=5e3,burnin=1e3,thin=5)

# comparison with homogenous ID code

m1bmcmc_homID<-MCMCglmm(export intensity ~1 + IMR + dummy-1, random=~idh(dummy): NACE industry code + ID code + idh(dummy): YEAR code +idv(~weight_europe:dummy1+weight_africa:dummy1+weight_asia:dummy1+weight_middle:dummy1+weight_northam:dummy1+weight_southam:dummy1+weight_oceania:dummy1+weight_others:dummy1)+idv(~weight_europe:dummy0+weight_africa:dummy0+weight_asia:dummy0+weight_middle:dummy0+weight_northam:dummy0+weight_southam:dummy0+weight_oceania:dummy0+weight_others:dummy0), rcov=~idh(dummy):units, data= dataset, family="gaussian",nitt=5e3,burnin=1e3,thin=5)

# comparison with homogenous INDUSTRY model

m1bmcmc_homINDUSTRY<-MCMCglmm(export intensity ~1 + IMR + dummy-1, random=~ NACE industry code + idh(dummy): ID code +idh(dummy): YEAR code +idv(~weight_europe:dummy1+weight_africa:dummy1+weight_asia:dummy1+weight_middle:dummy1+weight_northam:dummy1+weight_southam:dummy1+weight_oceania:dummy1+weight_others:dummy1)+idv(~weight_europe:dummy0+weight_africa:dummy0+weight_asia:dummy0+weight_middle:dummy0+weight_northam:dummy0+weight_southam:dummy0+weight_oceania:dummy0+weight_others:dummy0), rcov=~idh(dummy):units, data= dataset, family="gaussian",nitt=5e3,burnin=1e3,thin=5)

# comparison with homogenous REG model

m1bmcmc_homREG<-MCMCglmm(export intensity ~1 + IMR + dummy-1, random=~idh(dummy): NACE industry code +idh(dummy): ID code +idh(dummy): YEAR code
+idv(~weight_europe+weight_africa+weight_asia+weight_middle+weight_northam+weight_southam+weight_oceania+weight_others), rcov=~idh(dummy):units, data= dataset, family="gaussian",nitt=5e3,burnin=1e3,thin=5)

# comparison with homogenous YEAR model

m1bmcmc_homYEAR<-MCMCglmm(export intensity ~1 + IMR + dummy-1,random=~idh(dummy): NACE industry code +idh(dummy): ID code + YEAR code
+idv(~weight_europe:dummy1+weight_africa:dummy1+weight_asia:dummy1+weight_middle:dummy1+weight_northam:dummy1+weight_southam:dummy1+weight_oceania:dummy1+weight_others:dummy1)
+idv(~weight_europe:dummy0+weight_africa:dummy0+weight_asia:dummy0+weight_middle:dummy0+weight_northam:dummy0+weight_southam:dummy0+weight_oceania:dummy0+weight_others:dummy0), rcov=~idh(dummy):units, data= dataset, family="gaussian",nitt=5e3,burnin=1e3,thin=5)

m1bmcmc$DIC

m1bmcmc_homID$DIC

m1bmcmc_ homINDUSTRY$DIC

m1bmcmc_homREG$DIC

m1bmcmc_homYEAR$DIC

**We use similar type of regressions when testing the other dependent variables.**

Note: nitt=5e3,burnin=1e3,thin=5 are basic settings for coding and debugging. To fit the models using Markov chain Monte Carlo (MCMC) methods, researchers should typically use a larger number of iterations, a larger number of burn in iterations, and more thinning (e.g., nitt=1e5,burnin=1e4,thin=100). Additionally, the chain should be carefully evaluated (see Hadfield, 2010 ; Gelman et al., 2004 for discussions).

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