Born globals – presence, performance and prospects

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ABSTRACT

The concept born global firms has gained a spectacular increase in interest from both academic and political circles. Rigorous quantitative treatment of born global firms are however rare in the international business/economics literature. Implementing unique data on all Swedish start-ups during 1998–2008 in the manufacturing sector, we conclude that born global firms are a very rare event, that their prevalence seems invariant to time, and that they perform similar to other matched "twin" firms with regard to profitability and productivity but report a considerably higher growth in employment and sales. These results are robust to a wider definition of born global firms and to the timing of performance measurements.

1. Introduction

Natura non facit saltum (nature does not make jumps) was how Alfred Marshall (1920) explained why persistence over time could be observed for most economic variables and processes. Born global firms, a cleverly coined concept introduced in a McKinsey study in the early 1990s, are however claimed to do just that, i.e. adopt global patterns of internationalization from their very inception.[1] The concept has gained a spectacular increase in interest from academic and political circles over the last 15–20 years. Yet, the evidence to support a general shift towards a different mode of internationalization for small and young firms is by and large non-existent.

A theoretical framework as to why global strategies could be a superior way for start-up firms to rapidly exploit entrepreneurial opportunities has been provided by the international entrepreneurship literature (Etemad & Wright, 2003; Chetty & Campbell-Hunt, 2004; Knight et al., 2004; Oviatt & McDougall, 2005; Rugman & Verbeke 2008; Johanson and Vahlne, 2009; Wan et al., 2011). Moreover, changing organizational, environmental and strategic factors are likely to foster continued internationalization (Zahra & George, 2002), in addition to falling costs related to trade liberalization, dismantling of regulatory barriers and technological progress (Cavusgil & Knight,

2015).

Still, solid empirical backing of the alleged extent and performance of born globals is extremely scarce and comparisons with rigorously defined control groups are, to the best of our knowledge, largely neglected. Rather, most of previous empirical analyses in the born global literature primarily relies on either qualitative case-based studies or survey data drawing on a relatively limited number of observations (Gabrielsson et al., 2008; Kuuvalainen et al., 2012). These methodologies have their respective merits, however, they are not an accurate tool to shed light on the pervasiveness of large-scale internationalization by young firms, nor whether their performance is superior as compared to other similar firms. The results of previous contributions also vary depending on methods and time periods considered. In a recent review of the literature, Zander et al. (2015) stressed that there is a gap in the empirical research on born global firms that remains to be filled.[2]

Some notable exceptions are studies by Sleuwaegen & Onkelinx, 2014; Sui and Baum (2014) and Choquette et al. (2017). Just like these contributions we apply a longitudinal empirical model. Even though there are adjacent issues addressed in those studies, their research design is different as are the specific research questions posed. We test various definitions of born globals and also adopt a more extensive set

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[1] The concept of born global firms seems to have been used first in a McKinsey study of manufacturing exporters in Australia (McKinsey & Co., 1993). The study highlighted a number of small and medium-sized firms that from inception competed against established players on the global arena. Numerous studies have since labeled the same or similar phenomena differently: e.g. global start-ups (Oviatt & McDougall, 1994)), international new ventures (McDougall et al., 1994) and instant exporters (McAuley 1999). We will however not dwell into the differences between these labels, but stick to the concept born globals.

[2] See also Rialp et al. (2005, 2015) and Bals et al. (2008) for literature reviews.

of performance variables. Moreover, we demonstrate that the chosen methodology influences the level of the estimates while the overall direction basically remains the same. In particular, we implement a specific methodology to identify firms in the control group that are as close to our sample of born globals as possible, with the exception of internationalization. Hence, we stress the importance of a meticulous selection of an appropriate control group.

Our objective is thus to provide more conclusive evidence of the extent of born global firms, whether their share has increased over time and how they have performed as compared to other similar start-ups. A well-known characteristic of start-ups is their volatile performance, a considerable share of them even exit relatively soon after entering the market. But also for surviving firms there seems to be differences in growth dynamics between born globals and other firms (Cavusgil & Knight, 2015). In order to capture performance when a certain amount of stability has set in we focus on outcomes for firms surviving five years after inception. Hereby we can rule out temporary swings in their internationalization pattern.[3] Similar to previous contributions addressing this issue, export intensity is used as the criterion that distinguishes born globals from other firms.

Sweden is one of the few countries where it is possible to identify the entire population of born globals in the manufacturing sector. Implementing data between 1997 and 2008 we contribute with several new insights. First, irrespective of the strictness of definition (varying export intensities and years after inception), we conclude that becoming a born global firm is a quite rare phenomenon. Depending on the definition, the analysis reveals that between 0.6 and 3.3 percent of all Swedish start-ups in the manufacturing sector could be classified as born globals. In addition, we find that the share of born global firms is not increasing over time, rather a weak declining trend can be observed since the millennium shift.

Second, we extend the analysis to comprise a set of different performance variables while implementing a large number of controls. One distinguishing feature of our analysis is that we can control for internationalization through foreign local presence, which supposedly decreases the psychic distance to foreign markets. Yet, only a tiny share of start-up firms have established affiliates abroad. In addition, we can identify new firm formation due to spin-offs and mergers, which are excluded from the data set. Our results reveal that becoming a born global firm positively impacts size and sales performance, whereas no such effect can be established in terms of profitability. The results for productivity varies with the length of the time period studied.

Third, we extend the analysis to include a control group of identical "twin firms", with the exception of degree of internationalization, through a matching procedure. That enables us to compare born globals with a carefully selected and relevant control group to pinpoint differences in performance. We also look at persistence over time and find the results to be basically robust to such extensions. Finally, our access to data on export destinations allows us to briefly discuss the scope of internationalization.

The rest of the paper is organized as follows. The dominating theories of firm internationalization and the previous literature on born global firms are reviewed in Section 2 which forms the basis for our hypotheses. In the subsequent Section 3 the data is described and some descriptive statistics presented. Section 4 presents the model and the methodology used in the analyses, while Section 5 reports the regression results. The paper concludes by a discussion and summary of the findings, and also suggests some avenues for future research (Sections 6 and 7).

2. Firms' internationalization and performance: Previous research

Before embarking on the empirical analysis, we like to position the born global literature in relation to the most influential theories of firms' internationalization. Most studies on internationalization at the firm level can be found in the management and business administration disciplines. Overwhelmingly the literature deals with two modes of internationalization; foreign direct investment (FDI) and exports. Even though these regularly are analyzed separately, there are obvious links between them, e.g. where FDI generates exports through intra-firm trade. Overall, internationalization can be considered as a means to scale up production, exploit firms' proprietary assets and take advantage of foreign market opportunities.

With regard to smaller firms' internationalization the traditional approach builds on stage theories, a sequential process where firms start exporting products to their neighboring markets and thereafter gradually enter other more distant markets. Two main models have dominated the incremental stage approach to the internationalization process: the product life cycle theory by Vernon (1966, 1971, 1979) and the Uppsala internationalization model (Johanson & Vahlne, 1977, 1990, 2006, 2009). The former theory states that the internationalization process follows the product life cycle. Hence, as production enters more mature phases of the product cycle, production is located to other, often advanced, countries in order to serve local markets. At later stages, production facilities are set up also in low-cost countries. A related strand in the economics literature can be found in the spatial distribution of a firm's value-added chain across different countries (Fujita et al., 1999).

Also the Uppsala internationalization model emphasizes how the enterprise gradually increases its international involvement. It distinguishes between psychic and physical distance where the former includes differences in languages, cultures, political system etc., while the latter refers to geographical distance. As knowledge of foreign markets gradually increases, the psychic distance decreases and the firm tends to expand its sales to foreign countries even further.

Both the Vernon and the Uppsala models have however been criticized for not being able to fully explain the internationalization of small firms in today's global market (Andersson & Wictor, 2003; Chetty & Campbell-Hunt, 2004). A new paradigm, the so-called "global approach", was claimed to have emerged. According to for instance Gabrielsson and Kirpala (2012, p. 3), "A new breed of companies has increased in the last two decades". This approach is not captured by more conventional models and it is neither, as yet, proved empirically.[4] Thus, the jury is still out as Choquette et al. (2017) puts it.

There is also scattered evidence that small- and medium-sized firms do not follow an incremental stage approach. Rather a global strategy is adopted, either through exports and imports to a number of countries or through local presence (Autio et al., 2000; Shrader et al., 2000; Fan & Pan, 2007; Weerawardena et al., 2007; Zhou et al., 2007). A global strategy is claimed to allow firms to exploit advantages associated with global value added chains and to enhance their market knowledge, thereby empowering firms' networks and strengthening their competitiveness.

The reasons why we should expect new firms to adopt global strategies was first outlined by Knight and Cavusgil (1996). They argue that structural change together with technological progress explain the emergence of born globals. More precisely, the alleged rise in born global firms can be attributed: i) increased specialization fostering niche markets where competitiveness requires firms to increase their customer base by going global, ii) advances in technology regarding production and transportation, reducing traditional economies of scale factors, iii) advances in communication technology, facilitating monitoring and coordination, iv) advantages of small firms in terms of being more flexible and adaptive, v) globalization itself in terms of liberalizing trade, dismantling location obstacles together with more international experience at the individual level, and, finally, vi) trends

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[3] This is suggested by Zander et al. (2015).

[4] See also Cavusgil & Knight (2015) and Zander et al. (2015).

towards global networks which are facilitated by the advances in information technology. These prerequisites still seem valid and can be expected to facilitate the creation of born globals (Zahra & George, 2002; Cavusgil & Knight, 2015). That leads us to our first hypothesis:

Hypothesis 1. The share of born global firms has increased over the investigated period (1998–2006).

Others emphasize the effect of learning from internationalization, thereby acquiring a competitive edge. For instance, Autio et al. (2000) argue that young firms have superior learning abilities, are more flexible and can therefore integrate knowledge about foreign markets quicker than large incumbents (Johanson and Vahlne, 2009; Figueira-de-Lemos et al., 2011; Casillas & Moreno-Menéndez, 2014). A somewhat different but connected tack on born globals can be found in the literature on the link between exports and productivity (e.g. Clerides et al., 1998; Bernard and Bradford Jensen, 1999; Bernard et al., 2007). Despite difficulties establishing causality in some studies where more productive firms tend to self-select into export markets, others have found support that firms are "learning-by-exporting" (Castellani, 2002; Castellani & Zanfei, 2003; Criscuolo et al., 2004; Greenaway & Kneller, 2007; Andersson & Lööf, 2009. Such learning capacities and productivity effects should be increasing in firms' human capital, which born globals are claimed to have in comparison to other firms (Eurofound 2016).

Since born globals, by definition, soon after being founded enter foreign markets, most of the reasoning behind an export-productivity link should be applicable to the firms examined in the present analysis. If we chose to disregard potential inter-temporal learning-by-exporting effects, foreign entry should only be affordable to the more productive firms. Irrespective of learning effects, since born globals apparently consider it worthwhile to pay the initial sunk entry cost in early stages of their life-cycle, i.e. when the generation of cash flow normally is limited, they can be expected to hold high expectancies of growth, productivity and profitability by entering international markets.

Still, the evidence as regards performance is mixed. Almor (2011) found that Israeli born global firms dealt with recession better than other firms, while Sui & Baum (2014) conclude that productivity is higher for born globals as compared to those adopting a regional internationalizing strategy, but lower in relation to firms preferring a gradual export strategy. Survival rates also seems to be lower for born globals (Sleuwaegen & Onkelinx, 2014). Furthermore, Choquette et al. (2017) report mixed results with regard to performance while Autio et al. (2000) in an analysis of 57 Finnish firms conclude higher growth rates for born globals. As stressed in several of these contributions, it is important to allow some time to elapse before examining firm performance. Hence, taking stock on previous findings and assuming that firms on average are rational and self-select into adequate strategies (Sui & Baum 2014), we hypothesize that:

Hypothesis 2. Five years after inception, born global firms outperform other similar firms in terms of size, sales per employee, profit over sales and productivity.

As stressed in the previous literature there are countervailing forces at work. In particular, the double liabilities of being both new and entering foreign markets may impose strains and costs on the firms (Zaheer & Mosakowski, 1997; Carr et al., 2010; Salomon & Wu, 2012). One way of overcoming such hurdles is the possession of some kind of firm-specific assets that could mitigate these disadvantages and facilitate internationalization.[5] Likewise, having affiliates is likely to decrease psychic

distance to foreign markets and also to extend knowledge about markets for factors of production and customers (Zahra et al., 2000). However, these different veins have mainly been preoccupied with the internalization process of large multinational firms, whereas internationalization by young and small start-ups have been expected to take a different path (Gabrielsson et al., 2008). Yet, such differences are likely to become less pronounced due to e.g. improved and more cost-efficient ways of monitoring internationally dispersed production. Mudambi & Zahra (2007) show that there are no differences in survival rates between born globals and firms internationalizing gradually.

Moreover, a more open global economy may imply that there are strategically important reasons behind rapid internationalization in order to lock in new customers and more swiftly exploit proprietary knowledge (Bell et al., 2003). This seems particularly true in sectors with rapid technological change. Yet, internationalization may imply costs which are hard to identify ex ante. It has also been emphasized that rapid internationalization implies substantially increased risks related to access to scarce management competencies and other limited resources at the firm level, particularly in young and small firms (Andersson & Wictor, 2003; Oviatt & McDougall, 2005; Sapienza, Autio, George, & Shaker, 2006; Carr et al., 2010). Freeman et al. (2006) further add a number of key variables such as commitment and belief by senior management to the idea of internationalization, personal networks, unique technology as a source of competitive advantage, and international growth through partnership and alliances. Hence, this suggest that young firms aiming at fast internationalization need a strong resource base, i.e. size, solidity and capital may become important (Mudambi & Zahra, 2007; Prashantam & Young, 2011).[6]

In order not to risk a brittle resource base, a different strand in the literature suggests that a born regional approach is an alternative path without excessive risk exposure (Rugman et al. 2011; Sui & Baum, 2014). Sunk costs related to small firms' rapid internationalization may simply not be recouped (Braunerhjelm 1999; Melitz 2003). In order to take the above mentioned factors into account, we implement a number of control variables that leads to our final hypothesis:

Hypothesis 3. Firm performance is expected to be positively influenced by higher endowment of human capital, better market knowledge through local and foreign affiliates, larger size, higher equity ratio and higher performance levels the year of inception.

To sum up, there are obvious reasons to believe that the internationalization process of small and new firms has been simplified in the last decades, which should enhance both the frequency and the performance of born globals. There are however a number of moderating forces which we control for in the empirical analysis.

3. Data, variables and descriptive statistics

3.1. Data

The dataset is provided by Statistics Sweden and covers the period 1997-2008. Data are drawn from different registers, such as business statistics, exports of manufacturing goods, data on firm entry, and a matched employee-employer dataset.[7] Since access to statistics is considerably more restricted for the service sectors, the analysis will focus on firms within the manufacturing sector. The dataset includes all firms in the manufacturing sector, i.e. it is a population.[8]

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[5] This has been emphasized in the literature since long, in particular in Braunerhjelm (1996), Dunning's (1988) OLI framework. See also Cantwell (1991) and Davies & Lyons (1991). Braunerhjelm (1999) shows empirically how exports is increasing in small enterprises' endowment of tangible and intangible firm-specific assets.

[6] Wan et al. (2011) argue that firms' internationalization strategy is endogenous since it is influenced by a firm's resource base.

[7] The data is available through the MONA (Microdata Online Access) database, which is the standard tool for delivering microdata at Statistics Sweden.

[8] Due to threshold values for registration of exports to EU countries (Eliasson et al., 2012), some export data to the EU is not reported. Hence, there might be a moderate underestimation of the number of born global firms.

The year of birth is defined as the year when the firm first is registered in the business statistics. A new registration number could however also be due to spinoffs and merged firms, which we expect to have different characteristics compared to the total bulk of new firms (Gabrielsson et al., 2008; Andersson & Klepper, 2013). Whereas many other analyses (e.g. Choquette et al. 2017, where the one percent largest firms are excluded from the dataset) have to resort to different proxies to identify spin-offs, our data enable us to directly detect such start-ups. Hence, it is possible to exclude these two categories. Furthermore, new firms that subsequently merge or spin off part of their business are also excluded. Consequently we can identify truly new firms for the current analysis.[9]

In addition, we impose a restriction on persistence in global activities. More specifically, born globals exiting the export markets during the investigated time period, despite fulfilling the requirements of the definitions below of being a born global, are removed. The reason is that many of such switching firms have low sales and cannot be perceived as born global in the sense of Oviatt & McDougall (1994) or McKinsey & Co. (1993). Moreover, we only consider new firms where at least one person has its main employment to ensure that some economic activity is taking place in the firm. Finally, we have excluded firms that have been founded as an affiliate to another firm since they might represent something different than a genuinely new firm.

The described selection procedure implies that we can extract a subset of genuine born global firms. We agree with Gabrielsson & Kirpilani (2012) and Oyna & Alon (2018) that there is no generally accepted definition of born globals, and that a mechanistic adoption of a 25 percent export ratio three years after inception misses the point that born globals is likely to vary with the characteristics of the home country. As regards Sweden it has since long been an open economy with an export share in relation to GDP hovering around 50 percent, predominantly associated with relatively few and large incumbents. Over time their influence has diminished. The extent to which these large firms have impacted exports of smaller entrepreneurial firms is not obvious. On the one hand, large multinational firms could create an awareness of international opportunities among entrepreneurs. The willingness to start exporting at an early stage could therefore be higher in countries like Sweden. On the other hand, large incumbents might encapsulate "exports" through direct deliveries to these firms from new and young ventures. That is likely to generate a more gradual approach to exports. Hence, how large and relatively dominating firms in the manufacturing sector will influence the frequency and performance of born globals is basically an empirical question.

Export intensity of new and young Swedish firms have however increased somewhat in the last decades.[10] We have chosen to stick to the original definition of two years and a 25 percent export ratio. However, we will also report the results when we extend the time to attain an export share of 25 percent to three, four and five years. More precisely we implement the following baseline empirical definitions:[11]

1 *Stringent definition*: New firms with at least 25 percent exports of total sales within two years from inception *(abbreviation used below:*

BGF 2:25)

2 *Modest definition*: New firms with at least 10 percent exports of total sales within five years from inception *(abbreviation used below: BGF 5:10)*

3 *Alternative definition*: New firms with at least an average of 25 percent exports of total sales for three consecutive years no later than year two, three and four after firm foundation *(abbreviation used below: BGF 3ma:25)*

The first definition seems to be the most commonly used but we also test for the alternative definitions, i.e. a less and a more strict version (definition 2 and 3).[12] As noted above we will also extend the time span for the stringent version.

All the definitions require exports throughout the entire period once exports have been initiated but to be categorized as a born global the respective thresholds have to be attained during the given time periods. That is, an export intensity of 25 percent has to be attained either year one or two (definition 1), a 10 percent intensity any of the years one to five (definition 2) and an export intensity during a three-year period of at least 25 percent on average no later than year two, three and four (definition 3).[13]

The complete dataset of new firms is available from 1998 to 2008 but, since the objective is to analyze the subsequent performance of born global firms started in a certain year, the dataset is restricted as follows. In order both to include a satisfactory amount of born global firms and to be able to measure performance differences (employment, sales, profits and productivity) not too close to firm birth, the dependent performance variables are implemented five years after inception. Hence, the econometric analysis on performance is conducted on surviving firms being born during the years 1998–2003 with performance variables measured during 2003–2008.

Born globals are then compared to other start-up firms that have chosen a different strategy. Also in this case we impose some restrictions to make the comparisons between the groups of firms appropriate. New firms that are entirely focusing on the home market can be expected to be inherently different from exporting firms and are hence excluded from the dataset (McDougall et al., 2003; Wagner, 2007). Rather, the relevant comparison group is firms that initiate export activities, but not fulfilling the required definition to be considered born globals, suggesting a different strategy more along the lines of the sequential approach to internationalization. Such firms may not reach the stipulated export intensities or could have a more disruptive pattern of exports where years with no exports may be followed by years when exports do occur. We refer to them as *exporters*, which are used as a control group when comparing the characteristics of born globals to other firms. Compared to other studies using control groups, Choquette et al. (2017) is probably being closest to the current analysis. Their "late exporters" are similar to our exporters but could also overlap with our modest definition.

Altogether we have 8339 start-ups whereof 3377 survivors in the manufacturing sector during the period we are investigating. Imposing the restrictions referred to above implies that we end up with an unbalanced dataset comprising a mere 610 firms.[14] Of these 58, 52 and

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[9] Compare for instance with Sleuwaegen & Onkelinx, 2014 where data is restricted to a sample of firms having between ten and 249 employees.

[10] GEM (2018).

[11] The standard definition postulate an export intensity of 25 percent within two or three years (see Bals et al., 2008; Gabrielsson & Kirpalani, 2012; Choquette et al., 2017). Oviatt & McDougall (1997) and Moen & Servais, (2002) use a definition where "firms less than 20 years old that internationalized on average within three years of founding and generate at least 25 percent of total sales from abroad" (Knight et al., 2004, p. 649), to make sure that persistency prevails. This definition is also used on Swedish survey data in Rovira Nordman & Melén (2008) and Melén & Rovira Nordman (2009). However, the time period of study here does not allow for an investigation of firms as old as 20 years.

[12] As stated by Oyna & Alon (2018), the time criteria differ from one year (Ireland) to up to ten years (e.g. Switzerland). For Belgium, Sleuwaegen & Onkelinx, 2014 uses a five-year time span to identify born globals. For other Nordic countries a three year criteria has been used, but it is not evident why that should apply to Sweden, considering the large differences between the Nordic countries in terms of size distribution of firms, specialization and integration into the global economy.

[13] Henceforth we assume that firms fulfilling the above criteria have adopted born global strategies.

[14] In relation to population this figure is almost identical to the number in Sui & Baum's (2014) analysis of Canadian firms. As we go from a total pool of new manufacturing firms to those engaged in export activities, about 88 percent of

Table 1
Definition of independent and dependent variables, their notation and literature reference. All data from Statistics Sweden.

Variables (firm level and dummies)	
Definition independent variables	*Empirical (theoretical) notation*
Born global firms (share of exports after 2, 3 or 5 years)	$Bfg_i(bfg_i)$
Share of employees with post-secondary education	$Human_{it}(h_i)$
Market knowledge approximated by having Swedish affiliates	$Sw.\ aff_{it}(H_i)$
Market knowledge approximated by having foreign affiliates	$For.\ aff_{it}(H_i)$
Equity over total assets, capturing risk	$Eq_{it}(eq_i)$
Size measured as number of employees at year 1	$Size_{it}(S_i)$
Sales per employee at year 1	$Sales_{it}(v_{it}^k)$
Profit over sales at year 1	$profit_{it}(v_{it}^k)$
Value added per employee at year 1[*]	$Lp_{it}\ (v_{it}^k)$
Industry dummies based on the OECD's technology classification	*Industry dummies* (D)
Time dummies, annual	*Time dummies* (D)
Dependent performance variables	
Number of employees (five years after birth)	$Size_{it+5}(v^k)$
Sales per employee (five years after birth)	$Sales_{it+5}(v^k)$
Profit over sales (five years after birth)	$profit_{it+5}(v^k)$
Value added per employee (five years after birth)[a]	$Lp_{it+5}\ (v^k)$

[a] Value added consists of sales, or production value, after the subtraction of all procured inputs, i.e. components, semi-manufactures and services.

120 firms can be categorized as genuine born global firms according to the stringent, alternative and modest definitions. Depending on the definition of born globals, the remaining 552, 558, and 490 firms, respectively, are exporters that do not qualify as born global firms. They constitute the matching pool of firms to which the born global firms are compared.

In Table 1, the dependent and independent variables used in the econometric analyses are explained. The performance variables five years after firm birth are firm size, sales per employee, profits over sales and productivity defined as value added per employee. The independent variables of prime interest for our purpose are dummies for born global firms. Based on previous studies referred to above (see also Table 1) we control for firm size, human capital, equity ratio, dummies for Swedish firms with only national affiliates or with foreign affiliates[15], birth-year values of the performance measures of firm size, sales per employee, profits over sales and value added per employee. All quantitative variables reported are winsorized in order to remove extreme outliers.[16] The one percent largest and smallest observations are hereby given the 99th and 1st percentile values respectively.[17] Finally, industry and time dummies are implemented.

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the firms drop out (from 8339 to 982 firms, see Table 3). Mergers and acquisitions together with spin-offs account for somewhat more than 20 percent of the reduction in firms while the remaining decrease is due to the requirement of having one employee. Five years later 62 percent have survived (610 out of 982 firms).

[15] As can be seen from Table 2, among the start-ups covered in this study but a few can be defined as corporate groups.

[16] Deflation of variables is made using the consumer price index holding 2005 as base year. Data on CPI is from OECD, all values in Swedish Krona.

[17] When running the regressions without removal of the outliers, the results do however not differ in any major ways.

3.2. Born globals – some descriptive statistics

Table 2 reports the statistics for the dependent and independent variables distributed on all firms, the sub-sample *exporters*, and born global firms.[18] Comparing born global firms to the overall sample of firms surviving the first five years we see that they the year of foundation have a higher share of employees holding a post-secondary education diploma, which corroborates the findings by Eurofund 2016. They are also more prone to early on have affiliates, i.e. being a corporate group. Looking at the performance measures, born global firms seem to perform better on average in terms of employment, sales per employee and productivity. For the profitability measure, the results are not as clear. This holds both for the year of birth and five years afterwards.

When looking at industry classes[19], Table 3 shows that born global firms are most predominant within high technology manufacturing sectors (compare Bell et al., 2003). However, this is distinctive for all new firms with a positive export during 1998–2008, and is also an established fact in the more general empirical literature on firms' internationalization (Caves, 2007). Since the dataset implemented in the empirical analyses examines born globals founded 1998–2003 and surviving the first five years, panel A shows all firms born 1998–2003 whereas panel B shows those firms surviving the first five years. The table reports approximately 40 percent of the new firms surviving the first five years, a somewhat higher share for born global firms and *exporters* than for the total bulk of new firms. The survival rate is rather evenly spread across industries.

We conclude this section by looking at the internationalization pattern of born globals and the group *exporters* (Table 4). Born globals are perceived as firms that do not follow an incremental internationalization pattern, i.e. their first acquaintance with foreign markets is not necessarily bound to the regions geographically close or to a limited amount of countries. Some previous research has defined a threshold of five export destinations in order for a firm to be defined as a born global (Kuuvalainen et al., 2012; Sleuwaegen & Onkelinx, 2014). Here we do not implement geographical scope as a defining feature for born globals.

Panel A in Table 4 do however confirm that Swedish born global firms to a higher degree than other firms have approached more distant export markets, albeit quite modestly so (similar to Choquette et al., 2017). When firms first expand activities to foreign markets, 71 percent of all firms enter countries within the Nordic region. For born global firms this percentage is somewhat lower. Except for the Nordic export markets, born global firms are more likely to start their export market activities on all markets in comparison to other export entrants. We also see that there is a higher tendency for born global firms to enter multiple export countries simultaneously and to expand subsequent activities to more countries than other newcomers on export markets. The mean is actually close to five export destinations for surviving firms when applying the two most stringent definitions.

However, by comparing means and medians, one realizes that much of this difference is driven by a small number of firms, giving some support for the sequential schools of small firms' internationalization. The panel B descriptive statistics of firms surviving the first five years shows similar results with born global firms being more prone to enter multiple countries simultaneously.

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[18] Running T-tests on differences in sample means between *exporters* and the three born global firm definitions shows that the independent variables *Profits, Eq, For.aff* and the dependent variable *Profits* are not significant at the 10 percent level. Hence, differences in these variables should be interpreted with caution.

[19] The industry classes are based on the standard OECD-classification: low-technology, medium low-technology, medium high-technology and high-technology industries.

Table 2
Descriptive statistics.

Independent variables	Full sample (3377 obs)		Exporters (610 obs)		BGF 2:25 (58 obs)		BGF 3ma:25 (52 obs)		BGF 5:10 (120 obs)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Size	1.38	1.27	2.09	2.57	2.57	2.60	2.63	2.74	2.70	3.76
Sales	715140	2230909	1407017	4234542	3525484	11500000	3810649	12100000	2293902	8123927
Profits	0.06	6.85	−0.92	13.94	−0.11	1.43	0.07	0.27	−1.13	12.27
Lp	262023	611993	373206	1103113	988597	3105583	1039394	3271523	623311	2189078
Human	0.17	0.36	0.24	0.38	0.30	0.37	0.34	0.38	0.29	0.38
Eq	0.30	3.31	0.29	0.34	0.34	0.31	0.29	0.29	0.30	0.29
Sw.aff	0.0086	0.092	0.018	0.13	0.052	0.22	0.058	0.24	0.025	0.16
For.aff	0.0018	0.042	0.0066	0.081	0.017	0.13	0.019	0.14	0.0083	0.091
Dependent variables	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Size	2.26	15.40	5.55	35.89	24.53	113.59	26.44	119.86	14.36	79.35
Sales	852492	1522565	1506315	2951891	2277382	2453315	2271028	2589182	1922917	1996954
Profits	0.23	1.84	−0.04	2.38	0.08	0.21	0.01	0.73	0.03	0.50
Lp	328553	304049	435172	383153	590039	505150	588650	530094	498980	419161

Table 3
Decomposition into industry classes.

A. New firms 1998-2003

	# firms	# exporters	% exporters	# BGF 2:25	% BGF 2:25	# BGF 3ma:25	% BGF 3ma:25	# BGF 5:10	% BGF 5:10
Manuf high tech	418	85	20.3%	13	3.1%	6	1.4%	23	5.5%
Manuf medium high tech	1020	221	21.7%	37	3.6%	18	1.8%	69	6.8%
Manuf medium low tech	2235	254	11.4%	37	1.7%	24	1.1%	60	2.7%
Manuf low tech	4666	422	9.0%	46	1.0%	29	0.6%	83	1.8%
Total	8339	982	11.8%	133	1.6%	77	0.9%	235	2.8%

B. New firms 1998-2003 surviving first five years (within parenthesis the share of firms surviving first five years)

	# firms	# exporters	% exporters	# BGF 2:25	% BGF 2:25	# BGF 3ma:25	% BGF 3ma:25	# BGF 5:10	% BGF 5:10
Manuf high tech	166 (40%)	47 (55%)	28.3%	6 (46%)	3.6%	5 (83%)	3.0%	10 (43%)	6.0%
Manuf medium high tech	455 (45%)	136 (62%)	29.9%	18 (49%)	4.0%	13 (72%)	2.9%	38 (55%)	8.4%
Manuf medium low tech	1000 (45%)	169 (67%)	16.9%	16 (43%)	1.6%	17 (71%)	1.7%	29 (48%)	2.9%
Manuf low tech	1756 (38%)	258 (61%)	14.7%	18 (39%)	1.0%	17 (59%)	1.0%	43 (52%)	2.4%
Total	3377 (40%)	610 (62%)	18.1%	58 (44%)	1.7%	52 (68%)	1.5%	120 (51%)	3.6%

Note: The total number of exporters in the second column in panel A is slightly different from the equivalent number in Table 3. This has to do with the computation of firms belonging to the different industry classes based on their rounded shares in the total number of exporting firms from Table 3. Hence, summing the rounded numbers yields 982 in contrast to the 983 in Table 3.

4. Model and econometric specification

4.1. Model

In this section we build on insights from previous research referred to above in order to specify which variables to include and to formulate our hypotheses. Various dimensions of firm performance (v_i) seem associated with the choice to adopt a born global firm strategy (bgf), as well as other firm specific variables such as the endowment of human capital (h), knowledge of domestic and foreign markets (H), firm size (S) and financial solidity or risk (eq). In addition to these variables we also include dummies (D) for fixed effect related to industry technology class to and to capture business cycle effects.[20] Hence,

$$v_{it+5}^k = f\left(bgf_i, h_i, H_i, S_i, v_{it}^k, eq_i, D\right) \quad (1)$$

where the superscript k refers to the various performance measures implemented in the empirical analysis (size, sales, productivity and profit), while subscripts i and t denote firms and time.[21] A strategy that favors rapid internationalization, a larger endowments of human capital, superior domestic and foreign market knowledge through affiliates and is exposed to lower financial risks, can thus be expected to positively influence the performance of new firms, controlling for initial performance levels (to streamline the effect of becoming a born global as defined above). The expected signs of the variables could thus be expressed in the following way,

$$dv_{it+5}^k/dbgf_i > 0, \; dv_{it+5}^k/dh_i > 0, \; dv_{it+5}^k/dH^i > 0, \; dv_{it+5}^k/dS_i > 0,$$
$$dv_{it+5}^k/dv_i^k, \; dv_{it+5}^k/deq_i > 0 \quad (2)$$

where our core hypothesis implies a positive effect of a born global strategy on performance.

4.2. Econometric specification

In order to empirically test our hypotheses we implement two econometric techniques, starting with an OLS estimation which is followed by a nearest neighbor matching procedure. The latter controls for self-selection and reveals whether firms identical to born globals in all dimensions except for of internationalization strategies, perform differently. In the OLS estimations we regress performance five years after firm birth on born global firm dummies and a number of controls

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[20] The industry classes are the ones used in Table 4.
[21] Size is controlled for in all estimations.

Table 4
Export market destinations the first year of export market entry.

A. Export market descriptives for new firms the year of export market entry 1998-2003

	All firms (in total 385)		BGF 2:25 (in total 132)		BGF 3ma:25 (in total 77)		BGF 5:10 (in total 216)	
	number of firms	percentage	number of firms	percentage	number of firms	percentage	number of firms	percentage
Baltpol	58	15%	25	19%	20	26%	32	15%
Nordic	273	71%	82	62%	52	68%	152	70%
G8	123	32%	63	48%	41	53%	82	38%
EU	34	9%	21	16%	15	19%	26	12%
Others	106	28%	49	37%	30	39%	68	31%
	mean	median	mean	median	mean	median	mean	median
Exports	1261277	71550	3253226	475221	5080480	583502	2193651	222388
Export destinations	2.05	1	3.00	1	3.66	2	2.49	1
Export destinations (total)	5.83	2	10.26	4	14.30	6	8.28	3

B. Export market descriptives for new firms the year of export market entry 1998-2003 and surviving first five years

	All firms (in total 235)		BGF 2:25 (in total 60)		BGF 3ma:25 (in total 54)		BGF 5:10 (in total 127)	
	number of firms	percentage	number of firms	percentage	number of firms	percentage	number of firms	percentage
Baltpol	27	11%	15	25%	14	26%	20	16%
Nordic	190	81%	43	72%	39	72%	105	83%
G8	71	30%	34	57%	31	57%	46	36%
EU	21	9%	13	22%	12	22%	18	14%
Others	70	30%	31	52%	26	48%	47	37%
	mean	median	mean	median	mean	median	mean	median
Exports	1863198	89000	6067423	933693	6680205	1000460	3309426	205425
Export destinations	2.37	1	4.38	2	4.39	2	3.13	2
Export destinations (total)	7.70	3	17.78	10	18.20	10	11.81	5

Note 1: Baltpol stands for Poland and the Baltic states; Nordic is Norway, Denmark, Finland and Iceland; G8 is USA, Canada, Great Britain, Germany, France, Italy, Japan and Russia; EU is the 27 members of the EU except those included in G8; Others are the countries not listed above.
Note 2: Export destinations is the number of export destination countries the year of the firm's first export market entry; Export destination (total) is the number of export market destination countries for the firm during.1998–2008.
Note 3: Panel A shows a smaller number of firms than Table 4, panel A. This has to do with the restriction in Table 5 of export market entry no later than 2003. Some of the firms in Table 4, panel A, entered export markets later than 2003. Furthermore, the somewhat larger amount of born global firms in panel B compared to Table 3 has to do with the inclusion of "switching firms" in Table 5. These firms are few and we consider the descriptive statistics of this table to be unchanged had we excluded them.

delineating firm characteristics at birth. The reduced form specification looks as follows:[22]

$$Performance_{it+5}^{k} = a0 + a1\,Bgf_i + a2\,Size_{it} + a3Human_{it}$$
$$+ a4\,Sw.\,aff_{it} + a5\,For.\,aff_{it} + a6\,Performance_{it}^{k}$$
$$+ a7\,Eq_{it} + industry\,dummies + time\,dummies + v_{it}$$
(3)

Firms performing superior prior to export market entry will most likely be among the high-performing firms also five years after firm birth. Therefore we control for the initial level of the performance variables in the same manner as normally is done in cross-country GDP regressions in order to isolate the performance effect of becoming a born global firm (Barro 1991). All the quantitative performance variables used in the estimations are in logarithms and the error term is expected to exhibit standard properties.

The simple OLS estimations described above are however not able to control for the possible self-selection of high-performers into becoming born global firms. In the absence of a counterfactual for these firms it cannot be excluded that a born global firm should have performed differently than other firms even without the rapid entrance into export markets. To circumvent this potential problem, we implement a nearest neighbor matching procedure based on Abadie & Imberns (2002) and Abadie et al. (2004). The major advantage of such a matching approach is the possibility to create a quasi-experimental

setup where an adequate control group can be constructed. The aim is thus to create a control group of firms, i.e. a proxy for the counterfactual that is identical to the individual born global firm in all other dimensions except in its export activities. The export activities of born global firms would in an experimental design be labelled treatment whereas the born global firms would constitute the treatment group.

In accordance with Abadie et al. (2004), we let performance be denoted by Y_i, where

$$Y_i = Y_i(Bgf_i) = \begin{cases} Y_i(0) \\ Y_i(1) \end{cases} \quad \begin{matrix} if\ Bgf_i = 0 \\ if\ Bgf_i = 1 \end{matrix}.$$
(4)

Equation 4 thus states that $Bfg_i = 1$ for a firm with a born global export strategy (the treatment group) and $Bfg_i = 0$ for a matched twin firm with a more incremental approach towards export market expansion (the control group). Performance is hereby binary and allowed to take one value for a firm in the treatment group and another value for a matched twin firm in the control group. In case there would have been access to the actual counterfactual, it would have sufficed to calculate $Y_i(1)$-$Y_i(0)$ for an individual firm to estimate the performance differential. However, without such complete information on similar "twin" firms we have to resort to a proxy control group.

To identify firms similar to the born globals we use a vector Z of covariates in the matching procedure – initial levels with regard to firm size (employment), total sales, profits over sales, productivity as well as equity ratio, the ratio of employees with post-secondary education, whether the firm has Swedish or foreign affiliates, industry class and year of firm birth. Two regularity conditions has to be fulfilled:

For all z in the support of Z

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[22] See Appendix A for a correlation table. The relatively low correlations do not indicate severe problems with multicollinearity.

Table 5
Number and frequencies of born global firms in different samples (the share surviving first five years in parenthesis).

Year	# firms	# exporters	# BGF 2:25	# BGF 3ma:25	# BGF 5:10	% BGF 2:25	% BGF 3ma:25	% BGF 5:10
1998	1681 (36%)	221 (56%)	29 (48%)	20 (70%)	51 (49%)	1,73%	1,19%	3,03%
1999	1420 (38%)	192 (64%)	18 (28%)	9 (44%)	33 (39%)	1,27%	0,63%	2,32%
2000	1380 (42%)	173 (67%)	21 (67%)	15 (80%)	43 (63%)	1,52%	1,09%	3,12%
2001	1301 (42%)	147 (65%)	28 (36%)	12 (58%)	43 (51%)	2,15%	0,92%	3,31%
2002	1254 (44%)	123 (59%)	26 (42%)	13 (77%)	36 (42%)	2,07%	1,04%	2,87%
2003	1303 (42%)	127 (64%)	11 (36%)	8 (63%)	29 (62%)	0,84%	0,61%	2,23%
2004	1412	142	23	14		1,63%	0,99%	
2005	1802	135	20			1,11%		
2006	1801	127	26			1,44%		

Table 6
OLS results.

Dep. var.	Size$_{it+5}$			Sales$_{it+5}$			Profits$_{it+5}$			Lp$_{it+5}$		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Bgf2:25$_i$	0.384**			0.799***			0.190			0.545		
	[0.160]			[0.207]			[0.674]			[0.716]		
Bgf3ma:25$_i$		0.400**			0.736***			0.186			0.250	
		[0.169]			[0.236]			[0.718]			[0.827]	
Bgf5:10$_i$			0.363***			0.692***			-0.246 -0.246			0.495
			[0.100]			[0.168]			[0.515]			[0.525]
Size$_{it}$	0.911***	0.912***	0.900***	0.313***	0.316***	0.294***	-0.796***	-0.796***	-0.772**	0.544*	0.556*	0.530*
	[0.043]	[0.043]	[0.044]	[0.114]	[0.114]	[0.113]	[0.298]	[0.297]	[0.302]	[0.290]	[0.296]	[0.296]
Eq$_{it}$	−0.032	−0.018	−0.025	0.320	0.343	0.330	-0.826*	-0.823*	-0.828*	0.040	0.056	0.049
	[0.075]	[0.075]	[0.074]	[0.359]	[0.359]	[0.358]	[0.439]	[0.438]	[0.439]	[0.714]	[0.717]	[0.717]
Human$_{it}$	0.036	0.026	0.030	−0.358	−0.374	−0.369	0.243	0.238	0.259	−0.618	−0.618	−0.629
	[0.077]	[0.077]	[0.078]	[0.331]	[0.334]	[0.332]	[0.453]	[0.452]	[0.452]	[0.612]	[0.609]	[0.610]
Sw.aff$_{it}$	0.406*	0.402*	0.444*	−0.119	−0.104	−0.030	-5.158***	-5.157***	-5.106***	−3.624	−3.574	−3.567
	[0.232]	[0.231]	[0.231]	[0.269]	[0.264]	[0.266]	[1.769]	[1.772]	[1.785]	[2.894]	[2.906]	[2.875]
For.aff$_{it}$	−0.071	−0.079	−0.028	−6.579	−6.604	−6.506	-0.705	-0.706	-0.642	3.602***	3.629***	3.654***
	[0.226]	[0.231]	[0.219]	[5.937]	[5.935]	[5.928]	[2.975]	[2.977]	[3.032]	[1.183]	[1.136]	[1.173]
Sales$_{it}$				0.031	0.026	0.027						
				[0.031]	[0.031]	[0.031]						
Profits$_{it}$							0.141***	0.140***	0.140***			
							[0.044]	[0.044]	[0.045]			
Lp$_{it}$										0.173***	0.172***	0.172***
										[0.061]	[0.061]	[0.061]
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	604	604	604	604	604	604	593	593	593	604	604	604
R-squared	0.43	0.43	0.44	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08

Robust standard errors in brackets.
*significant at 10%; ** significant at 5%; *** significant at 1%.
Born global firms are in (1) defined as firms with an exports to sales ratio of at least 25 percent during 1 year within 2 years of inception, in (2) as at least an average of 25 percent 3 consecutive years during the first 4 years after foundation and in (3) as at least 25 percent during 1 year within 5 years of inception.
Size, Sales, Profits and Lp are in logarithms.

i *Bgf* is independent of ($Y(0), Y(1)$) conditional on $Z = z$
ii $c < Pr(Bgf = 1|Z = z) < 1-c$, for some $c > 0$

For similar firms, *i* implies that the choice of becoming a born global firm is purely random, i.e. assignment to the group of born globals is independent of the outcomes, conditional on the covariates. In addition, *ii* is an identification assumption stating that, given a certain covariate pattern, there has to be a probability to find a similar firm in the opposite group of firms for a match to be possible.

5. Results

Becoming a born global firm seems like a rare event, albeit it varies depending on sectors' technology intensity with the highest share in high-tech. In Table 5 the number of new and born global firms founded over the 1998–2006 time period is shown. Despite the wave of studies on born globals, and the alleged change in internationalization

strategies, they seem to constitute but a small share of all new firms, at least looking at the Swedish manufacturing sector.[23] Furthermore, born globals and other firms engaging in export activities (*exporters*) are more likely to survive the first five years compared to the total bulk of new firms.

As expected, born global firms are most prevalent using the modest definition compared to the stringent definition. By adopting the alternative definition the number of born global firms decreases even more than when the stringent definition is used. A more surprising observation is that no increase in the share of born globals can be observed over time, rather the share oscillates around 1.5–2.0 percent over the period 1998–2006. A weak decline can even be observed (from 1.73 in 1998 to 1.44 percent in 2006). Hence, the improved conditions for setting up a

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[23] For this particular variable we have preliminary data until 2011 and there is no discernible increase in born global firms.

Table 7
Differences between when two and three years cut-off for born global firms.

Dep. Var.	$Size_{it+k}$	$Sales_{it+k}$	$Profits_{it+k}$	Lp_{it+k}
Bgf2:25$_i$	0.384**	0.799***	0.190	0.545
	[0.160]	[0.207]	[0.674]	[0.716]
Bgf3:25$_i$	0.375**	0.782***	0.185	0.594
	[0.145]	[0.195]	[0.634]	[0.655]
Bgf2ma:25$_i$	0.453**	0.800***	0.420	0.794
	[0.177]	[0.237]	[0.721]	[0.709]
Bgf3ma:25$_i$	0.400**	0.736***	0.186	0.250
	[0.169]	[0.236]	[0.718]	[0.827]
Observations	604	604	593	604
R-squared	0.43	0.07	0.08	0.08

Robust standard errors in brackets.
* significant at 10%; ** significant at 5%; *** significant at 1%.
The dependent variables are *Size, Sales, Profits and Lp* 5 years after firm foundation, i.e. k = 5.
The different definitions of born global firms are Bgfx:y$_i$, where x is years after foundations and y is share of exports in sales, ma stands for moving average. The same controls as in Table 6 are used but their coefficients are omitted here for illustrative purposes.

Table 8
Results from nearest neighbor matching estimations (1216 observations throughout).

	Bgf2:25		Bgf3ma:25		Bgf5:10			
Dep.Var.	Coefficient	SE	Coefficient	SE	Coefficient	SE	Number of matches	Bias adjustment
Size$_{it+5}$	0,23**	0.10	0,34***	0.11	0,23***	0.08	1	No
	0,21*	0.12	0,38***	0.13	0,31***	0.08	4	No
	0,23*	0.13	0,34**	0.14	0,26***	0.09	1	Yes
	0,21*	0.12	0,35***	0.13	0,31***	0.08	4	Yes
Sales$_{it+5}$	0,79***	0.13	0,61***	0.14	0,68***	0.13	1	No
	0,82***	0.12	0,65***	0.12	0,73***	0.11	4	No
	0,70***	0.13	0,55***	0.13	0,59***	0.12	1	Yes
	0,71***	0.12	0,57***	0.12	0,63***	0.11	4	Yes
Profits$_{it+5}$	-0.06	0.53	−0.94	0.47	0.00	0.44	1	No
	0.11	0.56	−0.56	0.64	−0.37	0.38	4	No
	0.19	0.58	−0.78	0.67	0.07	0.42	1	Yes
	0.29	0.56	−0.34	0.64	−0.18	0.38	4	Yes
Lp$_{it+5}$	−1.55	1.03	−2,05*	1.14	−0.03	0.52	1	No
	−0.84	0.93	−1.77	1.15	−0.09	0.47	4	No
	−1.15	1.05	−2,05*	1.25	−0.17	0.53	1	Yes
	−0.72	0.93	−1.56	1.15	0.06	0.47	4	Yes

Size, Sales and productivity (*Lp*), the exception being profitability where size is shown to have a strongly significant negative impact. Hence, international expansion seems to induce costs that reduce the level of profits, at least over the first five years of the firm's existence.

Contrary to expectations, the estimations reveal no positive effects on performance of a higher ratio of employees with post-secondary education (*Human*). The effect of the market knowledge variable *Sw.aff* is ambiguous, varying between insignificant or weakly positively significant for all performance variables except profits where again a strong negative impact appears (profit column, Table 6). Having a foreign affiliate (*For.aff*) reveals no impact when regressed on the performance variables *Size, Sales* and *Profits*, while the effect on productivity (*Lp*) is highly significant in all three regressions (column Lp column, Table 6). The latter results confirm previous studies reporting a positive effect of internationalization, albeit here in terms of having foreign affiliates rather than exports. Still, since but a few of the firms in the sample have affiliates, these point estimates should be interpreted with caution.

As regards remaining controls, less exposure to (financial) risks (*Eq*), have no or miniscule influence on performance. Moreover, controlling for performance at firm birth show that high performers the year of firm

born global firm referred to above do not seem to have resulted in a surge for these types of firms for the years we are looking at. The last three columns show a fairly stable share of new born global firms ranging from one to three percent of the annual total bulk of new firms.

Turning to the results from the OLS estimations, they are presented in Table 6. Focus is on the coefficients of the born global firm dummies. When performance is measured by *Size* and *Sales*, we observe significant and positive estimates of the *Bgf* coefficients. The estimates are larger for the stringent and alternative definitions of born global firms. More precisely, depending on the definition of born globals, they are about 40 percent larger in terms of employees and their sales are around 70–80 percent higher as compared to the group of other exporters. There seems to be no significant influence of *Bgf* on performance when measured by profitability or productivity. This can partly be explained by the fact that the primary objective of new firms might not be to boost profits in the relatively short run of five years which is investigated here. Note that profits also influences the productivity variable (i.e. value-added adds up to wages and profit) per employee.

The point estimates for the control variables show very mixed results. The only control variable that has a significant influence on performance throughout the estimations is initial *Size*. The larger the firm is when founded, the better it performs five years later in terms of

birth also perform superior five years later, with the exception of the *Sales* regressions. Hence, there seems to be some influence of path dependency in the performance of born global firms.

Interestingly enough the effect of being a born global firm on performance seems robust to an increase from two to three years when defining these firms (Table 7). The coefficients as well as the significance levels remain remarkably constant. In Appendix B we extend the time period further by allowing four and five years before the 25 percent threshold is attained, and again the differences are relatively moderate. Hence, we conclude that the results are basically invariant to different limitations in the postulated time criteria to attain the 25 percent export intensity.

To capture the potential self-selection problem of firms with somewhat different characteristics being more prone to becoming born global firms, a nearest neighbor matching approach is implemented. Table 8 shows these results where matching of born global firms to other similar new firms is based on the covariates discussed in Section 4. Both one and four matches are used, with and without bias adjustment.[24] More matches take more of the available information into

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[24] Without exact matching in finite samples Abadie & Imbens (2002) show

account when estimating, but more matches also tend to imply more imprecise matches. A rather small number of matches should preferably be chosen according to Abadie & Imberns (2002), particularly when the sample is restricted to relatively few observations.

For the three definitions of born global firms, the results are significant when it comes to performance in *Size* and *Sales*.[25] Compared to the OLS estimates, these coefficients have the same sign but a somewhat different order of magnitude. Using a nearest neighboring matching approach, most of the estimations show a smaller positive impact on *Size* and *Sales* of being a born global firm than the corresponding OLS regressions revealed in Table 6.

In Table 8 the size of born global firms five years after being founded is shown to be 20–40 percent larger as compared to similar but less internationalized firms. Similarly, sales are also considerably higher, between 50 and 80 percent depending on which definition of born globals that is used. Still, in several of the regressions the estimated coefficients are considerably lower as compared to the OLS regression results. Note also that in two out of the twelve matching estimations, we observe a weakly significant and negative impact of being a born global firm on productivity (*Lp*). The remaining matching estimations on productivity and all estimations on *Profits* show no significant results.

As an additional robustness test we present the coefficients of a number of alternative OLS-regressions where definitions of born global firms and the time horizon of firm performance are allowed to vary. These robustness results strengthen the view of born global firms performing superior in terms of size and sales. They also indicate that born global firms have a tendency to perform better in terms of particularly productivity, where we find a positive effect as the time horizon is expanded to measure performance six and seven years after inception. This tendency is however very weak when the dependent variable is profitability, suggesting that internationalization implies sunk costs that it takes time to recoup. Hence, overall the results remain stable but it may be the case that some of the performance variables will take on more positive values in the longer run (see Appendix B).

6. Discussion

Implementing detailed register data and carefully selecting a representative control group, we find that born global firms in the Swedish manufacturing sector seem to be a rare phenomenon. The shares of born global firms range from 0.6 to 3.3 percent in relation to all new firms. Somewhat surprising these shares of born globals do not increase over the time period examined, contradicting our expectations. Thus, globalization and the widening market opportunities have not triggered more of highly internationalized start-ups in a small open economy like Sweden, irrespective of whether we look at the share of born globals or the number of export markets firms enter. Furthermore, even though born globals are present on a larger number, and more distant, export markets, the difference compared to other exporters is modest. An overwhelming part of internationalized start-ups enter few

export markets and predominantly in neighboring countries. Our *Hypothesis 1* is thus rejected.

Turning to our key issue concerning performance, our findings show that born global firms are considerably larger and have sales volumes that exceed less internationalized firms five years after inception. Throughout we control for industry and time specific effects.[26] The results are in accordance with Choquette et al. (2017), even though we are implementing a different econometric method and have used a specific procedure to streamline a control group that resembles the born globals as close as possible, i.e. controlling for selection biases. No such positive effects emerged for the remaining performance variables, i.e. profits and productivity, even though becoming a born global firm seems to enhance productivity in the somewhat longer time period (Appendix B). Hence, Hypothesis 2 is partly confirmed (size and sales and productivity in the extended time period), partly rejected (profits and productivity in the shorter time period). The results are robust to a number of different specifications introduced in the estimations.

Finally we turn to our control variables. Initial size, indicating a stronger resource base and some critical mass, fares best. It has a positive and significant effect in most of the regressions with the exception of profitability where a negative and significant effect emerge. Also, having Swedish affiliates is associated with negative effects, probably related to higher costs, whereas foreign affiliates are shown to induce a positive and significant effect. The latter suggests learning effects and a decreased psychic distance. Initial performance levels related sales, profit and productivity either exert a positive or an insignificant effect on performance five years later. Remaining controls, human capital and equity ratios, are insignificant in all specifications. Hypothesis 3 is consequently partly confirmed, partly rejected.

Born global firms thus seem to prioritize growth in employment and sales, whereas in particular profits seem to be of secondary importance, at least in the short-run. These results partly corroborate previous findings for Denmark (Choquette et al., 2017) and Belgium (Sleuwaegen & Onkelinx, 2014) where a positive relationship between born globals and growth in employment and sales was found, whereas a negative effect was concluded for productivity and firm survival. Contrary to these studies, we have implemented a carefully selected control group of twin firms identified through a matching procedure in order to isolate the effects of becoming a born global firm. These twin firms are similar to born global firms in most dimensions except for their export intensities. Hereby, we avoid drawing conclusions based on inadequate control groups since we believe born global firms to be inherently different from other exporting firms.

Another factor that distinguishes our study from the Danish is that we look at performance five years after entry in order to reassure that there is some persistence among the investigated firms. For similar reasons, we require firms to have at least one employee. When we extend the time period to six and seven years, the performance variable productivity is shown to be positively influenced by born global strategies, which contradicts the results of the Danish study. Hence, is seems critically important to allow for a sufficient time period to elapse before the productivity effects appear.

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that the matching estimator will be biased. Abadie & Imbens (2002) and Abadie et al. (2004) explain how to remove some of this bias using a bias-adjusted matching estimator. See Rubin (1973) and Abadie & Imbens (2002) for formal derivations.

[25] Due to the fact that the treatment, i.e. the assignment to the group of born global firms, might occur as early as the year of foundation, the matching regressions are also run on a subsample of born global firms assigned the status of born global firms not before the first year after foundation. Hereby, the matching precedes the assignment to the treatment group, which ideally is preferable. The results from matching on this subsample do not alter the fact that born global firms seem to perform better in terms of *Size* and *Sales*. In fact, the significance is even stronger when these matching regressions are run compared to what is presented in Table 8.

7. Concluding remarks

We present a first attempt towards analyzing how a country's total stock of born global firms in a given industry has evolved and performed, implementing a carefully designed econometric technique to assess the conceivable counter-factual development, that is, if firms had not adopted born global strategies. This extends previous studies that

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[26] Having access to firm-specific assets (as approximated by belonging to high-technology sectors) is also shown to influence the path of internationalization. The results on technology-intensity is not shown in the regression tables but are available on request.

have predominantly focused on selected cases, survey data or other sub-samples on born global firms and complements some recent studies using longitudinal data but different methods to select control groups.

No matter which definition of born global firms that is implemented, or which estimation technique or period that is used in the analysis, the results basically remain the same. We conclude that it takes time before strategies to internationalize rapidly pay off in terms of increased productivity and higher profits, whereas a positive effect is obtained for employment and sales. This is confirmed for profitability when we expand the years of the analysis, whereas a more positive effect on productivity is revealed. It is noteworthy that the quantitative effects of choosing a born global strategy decrease when we use the control group of matched firms, in some cases by about 50 percent.

This suggests that firms´ adopting global strategies from inception are more likely to be dependent on access to financial resources to cover short- to medium-run costs, such as venture capital, in order to bridge possible losses. That is further supported by the negative impact of size on profitability whereas it is shown to have a positive effect on the other performance variables. Similarly, the negative effect on profitability of having Swedish affiliates indicates management or organizational weaknesses, i.e. rapid growth may strain young and small firms' resources (compare Freeman et al., 2006).

These insights should obviously be of significance for management of new and young firms. Costs have to be recouped at some point in time and born globals have been shown to exit more frequently than other firms (Sleuwaegen & Onkelinx, 2014) and also to abandon their internationalization strategy (Sui & Baum, 2014), as compared to "traditional" exporters. Hence, long-term survival seems conditional on benevolent financiers and investors. It also gives some support for adopting a more gradual and less aggressive internationalization process, i.e. along the lines proposed by the Uppsala internationalization model (see Johanson & Vahlne, 1977; Rugman et al., 2011).

Still, in the longer run there are good reasons to believe that both profits and productivity are positively associated with born global strategies due to learning and scale effects. How lengthy that period is remains unknown and lack of detailed data for an extended period prevents us from more qualified assessments. In particular, access to longitudinal data over longer periods are required to analyze whether the insignificant impact on profitability at early stages is transformed into improved performance in the longer perspective, and whether the results for the other performance variables remain stable.

Moreover, our analysis is restricted to the years before the financial crisis 2008–2009 started to impact the world economy which could potentially influence the results. However, we believe that the results are likely to be similar also for the subsequent years, the main reason being that the global recession that emerged in the aftermath of the financial crisis led to an exceptional decline in trade volumes. Since the crisis growth in global merchandise trade volumes has decreased from almost seven percent to less than three percent annually, due to sluggish demand and protectionist measures. It is not until recently that global trade volumes have recovered.[27] Preliminary data up until 2011 reveals no increase in the share of Swedish born globals, but we cannot completely rule out that changes have occurred in the subsequent years.

If the trend towards increased globalization gain momentum as countries leave the "great recession" and the global business cycle improves, knowledge concerning how to internationalize and at what pace, is likely to become a key factor for successful new and young firms. Our study hints that only a limited number seem prepared for such change, nor have they taken steps to increase their internationalization The results also cast some doubts on the high expectations on born globals put forward by for instance EU (Eurofound 2012, 2016) and OECD (2013).

A concern regarding data is that we only take exports into account in the analysis while disregarding other means of internationalization, such as cross-border investments. Again, we do not think that this will have any major repercussions on our conclusions, given that young and new firms rarely have the financial resources to set up foreign operations. As noted above, we do however control for the presence of foreign (and Swedish) affiliates among the born global firms in the empirical analyses.

A potentially more just objection would be that we are neglecting globalization through the Internet, i.e. that customers or users are found globally even though operations are localized. Data on new and young digitized firms' global operations are however not available through official sources. Instead one would have to rely on surveys while this study implements register data for an entire population. Hence, internationalization through the Internet that is not captured in the exports statistics is a different issue that has to be analyzed separately. Moreover, since e-commerce, albeit growing, still constitutes a minor part of global retail sales (about 8.7 percent 2016 according to www.statista.com), we infer that the volume of trade over the Internet is quite small in relation to overall trade. Still a deeper understanding of those channels to rapid internationalization seems an important task for future research.

To conclude, the presence of born global firms seems strikingly modest and have not increased over time, their performance is not unambiguously superior to other exporting firms and their future prospects depend on their ability to handle the costs and risks associated with rapid internationalization.

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[27] According to CPB World Trade Monitor, world merchandise trade grew by on average 7 percent 1991-2007, were highly volatile 2008-2009, and grew by less than 3 percent 2010-2016. In 2017 growth in global trade volumes recovered to more than 4 percent during the first 11 months where data is available.

Appendix A. Correlation table

Variable	Size_{t+5}	Sales_{t+5}	Profits_{t+5}	Lp_{t+5}	Bgf2:25	Bgf3ma:25	Bgf5:10	Size_t	Sales_t	Profits_t	Lp_t	Eq_t	Human_t	Sw.aff_t	For.aff_t
Size_{t+5}	1.0000														
Sales_{t+5}	0.0915	1.0000													
Profits_{t+5}	−0.1535	−0.0493	1.0000												
Lp_{t+5}	0.1052	0.2805	0.3755	1.0000											
Bgf2:25	0.1897	0.0935	−0.0126	0.0277	1.0000										
Bgf3ma:25	0.1835	0.0784	−0.0118	0.0187	0.8817	1.0000									
Bgf5:10	0.2112	0.0994	−0.0512	0.0230	0.6550	0.6169	1.0000								
Size_t	0.6355	0.0787	−0.1386	0.0503	0.0920	0.0863	0.1327	1.0000							
Sales_t	−0.0141	0.0622	0.0298	0.0854	−0.0392	0.0374	−0.0218	−0.0525	1.0000						
Profits_t	−0.2150	0.0313	0.1623	0.0273	−0.0525	−0.0322	−0.0620	−0.1898	0.0094	1.0000					
Lp_t	−0.1104	0.0601	0.0962	0.2052	−0.0573	−0.0012	−0.0454	−0.0914	0.5752	0.4883	1.0000				
Eq_t	−0.0014	0.0577	−0.0427	−0.0130	0.0519	0.0039	0.0148	−0.0055	−0.1016	0.0786	−0.0453	1.0000			
Human_t	0.0096	−0.0516	−0.0093	−0.0678	0.0469	0.0768	0.0606	−0.0224	−0.0214	−0.0629	−0.1249	0.0185	1.0000		
Sw.aff_t	0.0911	0.0042	−0.1578	−0.0987	0.0821	0.0910	0.0259	0.0366	0.0399	−0.0391	0.0014	0.0673	0.0587	1.0000	
For.aff_t	0.0103	−0.1993	−0.0048	0.0293	0.0429	0.0479	0.0109	0.0076	−0.1174	−0.0881	−0.1417	−0.0374	0.0280	−0.0110	1.0000

Appendix B. Robustness regressions

In the table below the columns numbered 1–5 represent samples with firms surviving after 3,4,5,6 and 7 years. The extended definitions on born global firms refers to a combination of different time spans and export intensities, as compared to the three base definitions used in the paper (Bgfxyi), where x is years after foundations and y is share of exports in sales, ma stands for moving average). The different definitions of born global firms are regressed on the performance variables, using the same controls as in Table 6. The coefficients of the controls are not shown here but are of course available on request.'

Dep. Var.	Size_{it+k}					Sales_{it+k}					Profits_{it+k}					Lp_{it+k}				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Bgf2:25_i	0.288***	0.286**	0.384**	0.470***	0.575***	0.755***	0.610*	0.799***	0.579***	0.503***	−0.499	0.279	0.190	0.609	1.007	−0.354	−0.139	0.545	0.680**	0.851**
	[0.106]	[0.128]	[0.160]	[0.173]	[0.210]	[0.195]	[0.323]	[0.207]	[0.124]	[0.148]	[0.511]	[0.554]	[0.674]	[0.665]	[0.696]	[0.609]	[0.670]	[0.716]	[0.288]	[0.389]
Bgf3:25_i	0.313***	0.318***	0.375***	0.489***	0.584***	0.715***	0.579*	0.782***	0.522***	0.489***	−0.362	0.147	0.185	0.514	1.122*	−0.143	−0.095	0.594	0.629**	0.841**
	[0.096]	[0.115]	[0.145]	[0.160]	[0.196]	[0.187]	[0.297]	[0.195]	[0.123]	[0.149]	[0.478]	[0.539]	[0.674]	[0.634]	[0.642]	[0.553]	[0.602]	[0.655]	[0.276]	[0.378]
Bgf4:25_i	0.289***	0.277***	0.356***	0.443***	0.561***	0.461**	0.187	0.670***	0.474***	0.426***	−0.316	−0.366	−0.408	0.281	0.835	−0.205	−0.917	0.119	0.567**	0.774**
	[0.090]	[0.106]	[0.133]	[0.149]	[0.183]	[0.231]	[0.349]	[0.191]	[0.125]	[0.149]	[0.468]	[0.541]	[0.638]	[0.617]	[0.646]	[0.535]	[0.700]	[0.697]	[0.268]	[0.384]
Bgf5:25_i	0.304***	0.291***	0.353***	0.422***	0.561***	0.512**	0.228	0.729***	0.549***	0.491***	−0.217	−0.409	−0.256	0.416	1.116*	−0.276	−0.744	0.308	0.664**	0.799**
	[0.087]	[0.102]	[0.125]	[0.140]	[0.172]	[0.227]	[0.339]	[0.187]	[0.133]	[0.158]	[0.434]	[0.528]	[0.604]	[0.589]	[0.600]	[0.532]	[0.673]	[0.660]	[0.265]	[0.358]
Bgf2ma:25_i	0.320***	0.362*	0.453*	0.576***	0.675***	0.593***	0.896***	0.800***	0.549***	0.475***	−0.285	0.170	0.420	1.175*	0.807	−0.101	−0.111	0.794	0.571*	0.794*
	[0.119]	[0.144]	[0.177]	[0.189]	[0.228]	[0.174]	[0.236]	[0.237]	[0.140]	[0.165]	[0.512]	[0.601]	[0.721]	[0.631]	[0.800]	[0.623]	[0.748]	[0.709]	[0.304]	[0.423]
Bgf3ma:25_i	0.296***	0.341**	0.400***	0.505***	0.607***	0.592***	0.869***	0.736***	0.510***	0.446**	−0.156	0.134	0.186	0.898	0.476	−0.012	−0.445	0.250	0.517*	0.663
	[0.114]	[0.135]	[0.169]	[0.181]	[0.216]	[0.168]	[0.230]	[0.236]	[0.146]	[0.178]	[0.492]	[0.588]	[0.718]	[0.659]	[0.799]	[0.592]	[0.784]	[0.827]	[0.296]	[0.416]
Bgf4ma:25_i	0.323***	0.348***	0.420***	0.526***	0.666***	0.586***	0.835***	0.728***	0.535***	0.506***	−0.108	0.036	0.194	0.816	0.568	0.005	−0.402	0.260	0.529*	0.751*
	[0.111]	[0.131]	[0.160]	[0.172]	[0.204]	[0.165]	[0.216]	[0.222]	[0.146]	[0.172]	[0.474]	[0.581]	[0.685]	[0.636]	[0.739]	[0.570]	[0.745]	[0.771]	[0.285]	[0.405]
Bgf5ma:25_i	0.322***	0.349***	0.410***	0.517***	0.651***	0.585***	0.816***	0.749***	0.563***	0.537***	0.042	0.209	0.186	0.748	0.777	0.030	−0.349	0.299	0.515*	0.732*
	[0.106]	[0.122]	[0.147]	[0.157]	[0.190]	[0.160]	[0.200]	[0.208]	[0.142]	[0.173]	[0.454]	[0.549]	[0.650]	[0.607]	[0.693]	[0.542]	[0.700]	[0.718]	[0.275]	[0.386]
Bgf2ma:10_i	0.311***	0.314***	0.442***	0.524***	0.620***	0.592***	0.539**	0.710***	0.512***	0.489***	−0.357	0.086	0.098	0.548	1.075*	−0.009	−0.255	0.632	0.610**	0.706**
	[0.084]	[0.099]	[0.124]	[0.137]	[0.161]	[0.156]	[0.258]	[0.187]	[0.124]	[0.123]	[0.431]	[0.489]	[0.574]	[0.590]	[0.584]	[0.477]	[0.566]	[0.570]	[0.262]	[0.321]

Bgf3ma:10i	0.290***	0.300***	0.393***	0.447***	0.546***	0.615***	0.542**	0.699***	0.515***	0.492***	−0.193	0.135	−0.238	0.526	0.861	−0.041	−0.349	0.375	0.611**	0.682**
	[0.077]	[0.089]	[0.110]	[0.122]	[0.144]	[0.150]	[0.231]	[0.175]	[0.121]	[0.123]	[0.404]	[0.458]	[0.547]	[0.521]	[0.540]	[0.467]	[0.540]	[0.540]	[0.246]	[0.318]
Bgf4ma:10i	0.281***	0.280***	0.353***	0.407***	0.519***	0.624***	0.498***	0.714***	0.535***	0.498***	−0.094	−0.217	−0.209	0.619	1.096**	−0.108	−0.266	0.506	0.642***	0.649***
	[0.073]	[0.084]	[0.102]	[0.114]	[0.135]	[0.148]	[0.226]	[0.172]	[0.126]	[0.127]	[0.390]	[0.460]	[0.523]	[0.502]	[0.515]	[0.461]	[0.513]	[0.542]	[0.242]	[0.294]
Bgf5ma:10i	0.286***	0.288***	0.363***	0.416***	0.492***	0.608***	0.481**	0.692***	0.484***	0.492***	−0.061	−0.113	−0.246	0.386	1.175**	−0.106	−0.254	0.495	0.600**	0.677**
	[0.072]	[0.082]	[0.100]	[0.111]	[0.131]	[0.145]	[0.221]	[0.168]	[0.131]	[0.121]	[0.383]	[0.451]	[0.515]	[0.507]	[0.499]	[0.453]	[0.500]	[0.525]	[0.242]	[0.294]
Bgf2:10i	0.261***	0.254***	0.324***	0.421***	0.511***	0.629***	0.517***	0.608***	0.450***	0.396***	−0.267	0.154	0.079	0.488	0.641	−0.106	−0.442	0.322	0.585**	0.595*
	[0.076]	[0.092]	[0.114]	[0.128]	[0.147]	[0.159]	[0.239]	[0.177]	[0.120]	[0.118]	[0.415]	[0.476]	[0.555]	[0.558]	[0.600]	[0.462]	[0.560]	[0.592]	[0.244]	[0.311]
Bgf3:10i	0.287***	0.279***	0.315***	0.418***	0.527***	0.695***	0.576***	0.623***	0.484***	0.446***	−0.102	−0.078	0.126	0.465	0.683	0.140	−0.308	0.439	0.586**	0.627**
	[0.072]	[0.085]	[0.105]	[0.119]	[0.139]	[0.164]	[0.227]	[0.172]	[0.124]	[0.129]	[0.385]	[0.459]	[0.512]	[0.523]	[0.552]	[0.426]	[0.504]	[0.542]	[0.229]	[0.298]
Bgf4:10i	0.280***	0.274***	0.320***	0.405***	0.504***	0.519***	0.298	0.659***	0.505***	0.458***	−0.138	−0.312	−0.356	0.413	0.791	−0.046	−0.617	0.501	0.613***	0.636**
	[0.067]	[0.079]	[0.098]	[0.110]	[0.129]	[0.183]	[0.248]	[0.166]	[0.122]	[0.128]	[0.367]	[0.445]	[0.511]	[0.497]	[0.517]	[0.428]	[0.527]	[0.506]	[0.225]	[0.282]
Bgf5:10i	0.259***	0.239***	0.288***	0.382***	0.469***	0.525***	0.293	0.660***	0.551***	0.499***	−0.171	−0.368	−0.232	0.348	1.024**	−0.117	−0.755	0.641	0.724***	0.700**
	[0.065]	[0.076]	[0.093]	[0.107]	[0.126]	[0.184]	[0.251]	[0.171]	[0.127]	[0.130]	[0.366]	[0.438]	[0.491]	[0.499]	[0.511]	[0.439]	[0.534]	[0.499]	[0.239]	[0.284]
Observations	891	746	604	491	404	891	746	604	491	404	875	732	593	483	397	891	746	604	491	404
R-squared	0.40-0.41	0.43	0.43-0.44	0.43-0.44	0.44-0.46	0.13	0.13-0.14	0.07	0.03-0.03	0.06	0.10	0.10	0.08	0.09-0.10	0.04-0.05	0.10	0.11	0.08	0.07	0.09

Robust standard errors in brackets.
*significant at 10%; ** significant at 5%; *** significant at 1%.

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