Export Behaviour of Micro Firms in the Swedish Computer and Business Service Industries

Martin Falk and Eva Hagsten

Abstract

The export participation of SMEs in the Swedish computer and business service industries has increased rapidly over the last decade. Despite this, export participation rates—including those of micro enterprises—remained low at 13 per cent in computer services and 8 per cent in business services in 2010. Based on uniquely linked firm-level datasets with full coverage of micro enterprises, this study investigates the determinants of the export participation of Swedish SMEs in the computer and business service industries. Exports include both goods and services. Estimates based on the conditional fixed-effects logit model show a significantly positive relationship between initial labour productivity and the decision to export. One new and interesting finding is that the magnitude of the relationship between the probability to export and initial labour productivity is low when controlling for firm effects. Surprisingly, the impact of labour productivity on exporting in computer services does not differ between micro enterprises and other SMEs (10–249 employees). In business services, the relationship between export probability and labour productivity on the one hand and skill intensity on the other is significant for micro enterprises, but not for other SMEs (10–249 employees).

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1   Introduction

The export participation of small and medium-sized enterprises (SMEs) in the Swedish computer service industry has increased rapidly—and faster than in business services—over the last decade. The proportion of exporting micro enterprises (defined as those with 0–9 employees and exports of goods or services), for instance, has increased from 6 to 10.5 per cent between 2001 and 2010, whereas that of SMEs with 10 to 249 employees soared from 62 to 73 per cent (see Table 1 on page 10). In business services, the export participation of micro enterprises also rose, but to a lesser extent (from 5.7 to 7.5 per cent), while that of other SMEs stagnated at around 44 per cent.

Despite the general increase in exporting among Swedish software and business service firms, micro enterprises face a significant disadvantage in exporting. SMEs, and micro enterprises in particular, are confronted by a wide range of export barriers, including limited information about foreign business opportunities, insufficient human resources, a lack of language skills and financial resources, as well as constrained access to suitable distribution channels, along with other external barriers (Leonidou, 1995, 2004). The increased tradability of services can be explained by advances in ICT and logistics, reduced trade barriers for services, and new forms of international financial transfer options (OECD, 2013).

In recent years, a number of studies have investigated the export behaviour of small and medium-sized firms. Size, labour productivity, innovation activities, skills, and foreign ownership are considered key determinants of export participation and export intensity (see Leonidou et al., 2007 for a survey of SMEs and Greenaway and Kneller, 2007 or Wagner, 2007 for general surveys of productivity and exporting). However, micro enterprises are often omitted from these studies due to data deficits. The lack of studies on micro enterprises is thus a result of difficulties in obtaining information on exports and other relevant firm-specific information (besides employment and age, which can be found in business registers or structural business statistics). Additionally, trade statistics are often subject to reporting thresholds. Eickelpasch and Vogel (2011), for example, report that small enterprises with an annual turnover of €250,000 or less (equal to a firm with five employees, assuming each employee generates an average of €50,000 in sales) are not obliged to provide information about their export activities to

authorities compiling German business service statistics. Therefore, firms with marginal exports are difficult to capture based on official trade statistics.

Regardless of the increasing number of firm-level studies on the drivers of exports, few studies have focused exclusively on service SMEs. One exception is a study by Lejárraga and Oberhofer (2015), who examine the export behaviour of French SMEs in the service sector based on the AMADEUS database. Previous studies on Swedish firm-level data are often limited to manufacturing firms (including firms with 10 or more employees; see Hansson and Lundin, 2004; Greenaway et al., 2004; and Andersson and Lööf, 2009; for studies that include micro enterprises, see Andersson et al., 2008; and Eliasson et al., 2012). To our knowledge, no corresponding study has been conducted on microenterprises in service industries.

Studying the export behaviour of SMEs (including micro enterprises) is particularly interesting because these firms are potentially dynamic, often young, and growing more quickly, but also exiting the market at higher rates. Therefore, there are good reasons to believe that the firm-specific determinants of exporting differ between micro enterprises and SMEs in general. Meanwhile, virtually all large software firms already export their products, which makes analyses of their export decisions less informative.

This paper analyses the determinants of the export participation of Swedish SMEs in the computer and other business service industries (codes 72 and 74 in NACE rev 1.1) with particular emphasis on micro firms (0–9 employees). One strength of the study is its use of a uniquely linked and representative firm-level dataset that encompasses the total population of firms with less than 250 employees. In particular, the data consists of the linked business register, the VAT database for exports, and structural business statistics. Using the VAT register for information on exports provides a way to work around several disadvantages of the trade in services statistics, which is both a sample survey and suffers from a gap in the times series covered during the period under review. The empirical model employed is a conditional logit model, which makes it possible to control for unobservable firm effects. For the sample of Swedish service SMEs (0-249 employees), exporting is a rare event: In 2010, only 12.9 per cent of these firms in computer services and 8.4 per cent in business services exported goods or services. Therefore, this analysis focuses on the extensive margin rather than the intensive margin.

The computer service industry is an appealing case for our purposes for a number of reasons. First, it represents a knowledge-intensive business service with a high level of innovativeness. Second, the tradability of computer and software services has rapidly increased due to the Internet and other technological developments. Third, the locations where a computer service is provided and received need not be the same; in other words, the service does not necessarily have to be consumed at the same time and in the same place as it is offered, as is the case with many other services (Hill, 1999). Fourth, the computer service industry consists of many small enterprises and is one of the fastest-growing industries in the economy. Previous studies on ICT and software companies are often based on small surveys (see Bell 1995, 1997; Coviello and Munro, 1997; Garvey and Brennan, 2006; Ojala and Tyrväinen, 2007; and Terjesen et al., 2008). Fifth, we focus in particular on the export participation of the computer service industry because it is one of the few service industries in which export participation has increased over time (see Table A1 in the appendix).

Professional and business service firms are an interesting complement to our analysis of computer service firms. Although it is less homogenous than computer services, this industry also features knowledge-intensive services and a high share of skilled workers. Professional and business services are also key users of new software products and exhibit a high ICT intensity (Miles, 2005). Further characteristics of this industry include its high output and employment growth rate. Meanwhile, computer services and business services are both unlikely to face the same entry barriers related to sunk costs as capital-intensive services are (Love and Mansury, 2009).

The structure of this paper is as follows: Section 2 presents the theoretical background and empirical model. Summary statistics are presented in Section 3, and Section 4 offers a range of empirical results. Section 5 contains some concluding remarks.

2 Theoretical background and empirical model

To examine the determinants of export behaviour in the computer and business service industries, this study builds on the recent stream of literature on firm

heterogeneity and international trade based on work by Melitz (2003), which shows that only more productive firms find it profitable to export. In particular, the sunk costs of foreign market entry can only be met by larger and more productive firms. These costs consist of transportation, distribution or marketing, and additional workers to manage foreign networks (Wagner, 2007). Helpman, Melitz, and Yeaple (2004) come to the conclusion that the least productive firms serve only their domestic markets, while more efficient firms export and the most efficient firms engage in both exports and FDI. Overall, this implies that highly productive firms select themselves into exporting. A positive link between lagged productivity and export status is referred to as the self-selection hypothesis.

Empirical studies confirm this positive relationship between productivity and the export status (see Greenaway and Kneller, 2007 or Wagner, 2007 for a survey). Using firm-level data for three countries, Clerides, Lach, and Tybout (1998) show that causality runs from productivity to export status, with more productive firms being more likely to export. Furthermore, another stylised fact of the literature is that larger firms are not only more likely to export, but also exhibit higher export intensity (see Wagner, 1995, 2001; Harris and Li, 2009). In a study on the export decisions of manufacturing firms in the United States, Bernard and Jensen (2004) show that—apart from favourable exchange rate shocks—size, productivity, labour quality, ownership structure, the introduction of product innovations, and past successes in export markets are factors that increase the probability of exporting. Meanwhile, few studies focus explicitly on business services or on SMEs including microenterprises. Using panel data on Swedish firms in knowledge-intensive business services with more than 10 employees, Lööf (2010) finds that the probability of exporting depends positively on labour productivity, capital intensity, and human capital (measured as the number of employees with at least three years of university education). Based on data on business service firms in three large European countries, Temouri et al. (2013) report a positive association between labour productivity and exporting. Kox and Rojas-Romagosa (2010) also find that labour productivity is a significant factor in exporting by examining firm-level data for the Netherlands and a broad definition of service industries, while human capital is not relevant. However, these studies do not distinguish between SMEs and large firms, nor do they cover micro enterprises. The relationship between export status and productivity may be more pronounced for SMEs or microenterprises than for large firms due to very small firms'

generally lower productivity level general and their sunk costs of exporting being higher than those of large firms.

Studies of the determinants of SMEs' export behaviour reveal similar results. Hollenstein (2005) concludes that the most important drivers of the internationalisation of SMEs are the advantages arising from the availability of human knowledge and physical capital, as well as some firm-specific assets in fields like marketing, organisation, and finance. Using firm-level data for French service SMEs, Lejárraga and Oberhofer (2015) find that export decisions depend significantly on total factor productivity, firm size, and foreign ownership. A firm-level study focusing on SMEs in transition economies also shows that both human capital and technology-related factors are important sources of international competitiveness, as are industry linkages, firm size, share of foreign capital, sector of activity, availability of external financing, and membership in business associations (Gashi et al., 2014). Export decisions not only depend on labour productivity, but also on human capital. Schott (2004) adds further evidence of the importance of highly skilled employees in determining the export activities of a firm. Skill intensity can be regarded as a proxy for firms' innovation activities in the absence of such data (Hollenstein, 2005). Previous studies find a strong and significant relationship between innovation performance and firms' skill intensity (Filatotchev et al., 2011).

Taking into account the findings of earlier research on the determinants of exporting, we model export behaviour as a function of labour productivity, skill intensity, foreign ownership, and control variables. The logit model for the panel of data is thus specified as follows:

$$XD_{it}^{*} = \beta_i + \delta_t + \beta_1 \log(Y_{it-1}/L_{it-1}) + \beta_2 HK_{it-1} + \beta_3 FOREIGN_{it-1} + \beta_4 SIZE_{it-1} + \beta_5 AGE_{it} + \varepsilon_{it}$$

Here, XD_{it}^{*} represents the probability to export, with the observed variable taking the value of 1 if the firm is an exporter and 0 otherwise:

$$XD_{it} = \begin{cases} 1 & \text{if } XD_{it}^{*} > 0 \\ 0 & \text{otherwise} \end{cases}$$

Y_{it-1}/L_{t-1} indicates gross output per employee in the previous year. SIZE and AGE denote the size and age of the firm. HK_{it-1} represents the proportion of

highly skilled human capital at firms (the proportion of employees with post-upper-secondary education). FOREIGN is a dummy variable indicating majority foreign ownership (read: firms with foreign-owned equity of 50 per cent or more). SIZE is measured as employment or using size dummy variables. AGE is a dummy variable equal to one if the firm is five years old or younger. β_i is the firm effect, δ_t are the time effects that control for macroeconomic influences, and ε_{it} is the error term. All explanatory variables except size and age are lagged by one year in order to mitigate problems with endogeneity.

The determinants of export participation may be estimated by the fixed-effects or random-effects logit model. A standard logit model is likely to lead to biased estimates because it cannot control for any unobservable firm effects that influence decisions to export. The random effects model, meanwhile, assumes that unobserved firm characteristics are uncorrelated with the error term and is inconsistent in cases of correlation. The advantage of the fixed effects model is that there is no assumption made regarding the correlation between the firm effect and the error term. Therefore, we use the conditional logit model introduced by Chamberlain (1980). Concerning export status, the conditional fixed-effect logit model only includes firms whose export status changed over the period under review. This means that at least one switch in the export status dummy is necessary. When there is little or no variation in the dependent variable over time, the random effect logit model is appropriate. Given that SMEs are a heterogeneous group with respect to age and firm size, separate estimations are conducted for micro enterprises and other SMEs (those with 10 to 249 employees).

3   Data and descriptive statistics

In order to analyse the export behaviour of SMEs, information from the Swedish business register, education register, and structural business statistics has been linked with the VAT register for information on exports of goods and services. The VAT register is particularly useful in this case, as it includes all firms and their export values; it thus addresses issues related to the gaps in the time series and the fact that the statistics on the international service trade are based on a

sample survey. The data consists of information on computer and other business service industries (industries 72 and 74 in NACE rev. 1.1) for the period 2002–2010. Employment is measured in terms of full-time-equivalent employees. Output is measured as gross output in nominal (SEK) prices. We do not use value added because it is often a less appropriate measure for very small firms, which exhibit many negative values. The proportion of employees with post-upper-secondary (or tertiary) education is based on international ISCED definitions.

A common feature of the databases is their solid coverage of micro enterprises, which account for 95 per cent of the total population of firms. Another shared aspect of the dataset is the availability of a panel over time, which makes it possible to account for firm effects. A further advantage of using VAT statistics on exports is that, unlike in trade statistics, there are no reporting thresholds. These thresholds are often different for intra- and extra-EU exports. The motive behind the imposition of reporting thresholds for exports involves reducing the reporting burden on small exporters and the costs of data processing and collection for statistical offices. A minimum reporting threshold in trade statistics most likely leads to an underestimation of the percentage of SME exporters, but will not have a large impact on the total export value of SMEs. This holds particularly true for the group of micro and small enterprises, which are often marginal exporters. In order to check the extent of the differences across the two data sources, the percentage of exporters (goods and/or services) is calculated based on data for the Swedish business sector for the year 2010.

Table A2 (see appendix) shows that there are large differences between the two data sources. For the SMEs (defined as 0 to 249 employees) in the total business enterprise sector, the percentage of exporters is 3.7 per cent based on the linked trade and structural business statistics, and 6.9 per cent based on the similarly linked VAT statistics. For micro enterprises, the corresponding shares based on trade and VAT statistics are 2.7 per cent and 5.7 per cent, respectively. The share of exporters among SMEs based on VAT statistics is thus almost twice as large as that of trade statistics. This clearly shows that VAT statistics—or, sample-survey-based information (such as the Community Innovation Survey for firms with 10 or more employees)—are more appropriate than trade statistics in calculating the share of exporting SMEs. However, few statistical offices in the EU countries can provide information on numbers of exporters by firm size based on the VAT database.

The estimation sample includes 27,160 firms in business services and 6,730 firms in computer services. If the sole proprietorships are excluded, the dataset covers 14,650 and 3,890 firms, respectively. Descriptive statistics for the sample of computer service firms show that few SMEs are exporting: In 2010, only 13 per cent of these firms exported goods or services (Table 1). The corresponding figure for business services is 8.4 per cent. Export participation, however, is not homogeneous across firm size; when micro enterprises are excluded, it is much higher—at 73 per cent for computer services and 45 per cent for business services. Micro firms engage in exporting at a rate of 10.5 (computer services) and 7.5 per cent (business services), which indicates that these firms mainly serve their domestic markets.

Another important feature of the SMEs is the strong increase in their export participation over time. This holds particularly true for micro enterprises, which exhibit an increase of 4.5 percentage points in computer services and 1.7 percentage points in business services over the period 2001–2010. The low export participation rate of service firms is consistent with recent evidence for Austrian micro service firms (Wolfmayer et al., 2013).

The low export participation rate of micro enterprises can be explained by several factors. One explanation is that new software or supporting firms have often emerged from spin-offs of workers previously employed by large service or manufacturing companies (Weterings and Koster, 2007). Hence, indirect exporting may be a reason for the (officially) low export participation rates of micro firms in these industries. In addition, many software or business service firms stem from outsourcing activities by manufacturing firms. This often leads to new business units. In those cases, it is not especially necessary to look for foreign clients because the existing supplier-buyer relationships are strong.

Table A3 (see appendix) shows that exporting SMEs in computer and business services are more productive on average and also employ a higher share of workers with tertiary degrees. It is interesting to note that the differences are more pronounced for micro firms than for other small and medium-sized firms. On average, the output per employee of exporting firms is 55 and 81 per cent higher than that of non-exporting firms. The output per employee of firms that have just started exporting corresponds to average increases of 27 and 48 per cent in export participation rates. In addition, exporters exhibit a share of workers with tertiary

degrees that is six percentage points higher for both computer and business services. Firms new to exporting also have a higher skill intensity.

Table 1: Evolution of export participation of SMEs in computer and business services industries over time (percentages)

| | Computer services (72) | | | | | |
| | Export status | | | Export starters | | |
	0–249	10–249	0–9	0–249	10–249	0–9
2001	9.0	62.0	6.0	n.a.	n.a.	n.a.
2002	8.9	64.8	6.2	2.3	9.9	1.9
2003	9.0	69.4	6.6	2.2	9.9	1.9
2004	10.4	72.1	8.2	3.3	8.5	3.1
2005	10.3	71.6	8.0	2.6	7.9	2.4
2006	10.9	71.9	8.6	2.7	7.5	2.5
2007	12.0	71.1	9.6	3.5	8.0	3.3
2008	12.1	70.2	9.7	2.7	6.5	2.6
2009	12.5	71.4	10.1	3.0	7.2	2.8
2010	12.9	73.3	10.5	3.0	7.2	2.8
change 2001(2002)-2010	3.9	11.3	4.5	0.7	–2.7	0.9
	Business services (74)					
	Export status			Export starters		
	0–249	10–249	0–9	0–249	10–249	0–9
2001	7.0	44.2	5.7	n.a.	n.a.	n.a.
2002	6.7	43.0	5.6	1.7	6.8	1.6
2003	6.3	42.2	5.3	1.6	5.8	1.5
2004	7.8	43.7	6.9	3.0	7.3	2.9
2005	7.4	43.0	6.5	2.2	5.4	2.1
2006	7.6	42.7	6.7	2.2	6.1	2.1
2007	8.5	44.3	7.6	2.9	7.1	2.8
2008	8.5	45.5	7.5	2.4	7.0	2.3
2009	8.4	44.0	7.5	2.3	5.1	2.3
2010	8.4	44.6	7.5	2.4	6.6	2.3
change 2001(2002)-2010	1.4	0.3	1.7	0.7	–0.2	0.7

Source: Swedish ESLAIT data, Statistics Sweden, own calculations.

4   Empirical results

Table 2 reports the results of the fixed-effects conditional logit model of the exporting decisions of Swedish SMEs in the computer and business service industries and in business services for the period 2002–2010.[1] Two different specifications are used: one with the share of university graduates and control variables (specification i), and the other with the share of university graduates and the log ratio of output to employees, both with one-year lags (specification ii). The regressions for the log output to workers ratio exclude sole entrepreneurs without employees because output per employee is undefined in cases involving zero employees. The table includes both coefficients and marginal effects.

The year dummy variables are positive and significant at the five per cent level in the majority of cases, indicating that the export participation of computer service firms did not decrease much during the economic and financial crisis in 2009. For business services, export participation is at its highest in 2007 and 2008. The results for SMEs (including micro enterprises in computer services) show that firm size, skill intensity, and labour productivity are all significantly and positively related to the probability of exporting goods or services. This means that SMEs with higher proportions of employees with tertiary degrees and higher productivity levels in the previous year are more likely to become exporters. However, the magnitude and significance of the tertiary graduates share decreases markedly when the ratio of output to employees is included (specification ii) and is only significant at the 10 per cent level.[2]

This implies that a high productivity level is more important than a high share of university graduates in determining decisions to export. The marginal effects show that an increase in labour productivity by 10 per cent raises the corresponding export probability by 0.26 percentage points. This is a small effect given the mean export participation rate (11 per cent) over the period.

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[1] The STATA command xtlogit (with the FE option) is used to estimate export decisions.

[2] Note that multicollinearity between skill intensity and labour productivity is unlikely to be a major problem; the correlation is less than 0.30 and significant at the one percent level.

Table 2: Determinants of exporting in Swedish SMEs in computer and business services for the period 2002–2010

			Conditional logit model **Computer services**							
	(i)		**0–249 employees**			**(ii)**		**1–249 employees**		
	coeff.		z	m.e.		z	coeff.		z	m.e.		z
size 10–49	1.45	***	20.35	0.276	***	25.41	1.17	***	15.66	0.094	***	7.02
size 50–249	2.55	***	14.14	0.347	***	26.24	2.12	***	11.17	0.109	***	6.73
age: five years or younger	–0.17	***	–4.17	–0.040	***	–4.04	–0.21	***	–3.81	–0.022	***	–3.08
foreign-owned t–1	–0.10		–0.96	–0.023		–0.95	–0.09		–0.79	–0.010		–0.77
share of tertiary graduates t–1	0.18	***	3.06	0.044	***	3.08	0.15	*	1.80	0.016	*	1.80
log output per employees t–1							0.24	***	10.35	0.026	**	17.40
yr2003 (ref 2002)	0.03		0.48	0.006		0.48	0.04		0.70	0.005		0.72
yr2004	0.38	***	7.32	0.087	***	8.26	0.24	***	3.70	0.024	***	4.02
yr2005	0.28	***	5.38	0.065	***	5.85	0.01		0.11	0.001		0.11
yr2006	0.35	***	6.63	0.081	***	7.46	0.14	**	2.06	0.014	**	2.25
yr2007	0.48	***	8.74	0.108	***	10.49	0.26	***	3.67	0.025	***	4.03
yr2008	0.38	***	6.74	0.087	***	7.70	0.17	**	2.37	0.017	**	2.59
yr2009	0.36	***	6.23	0.082	***	7.06	0.21	***	2.80	0.021	***	3.06
yr2010	0.35	***	5.88	0.080	***	6.63	0.25	***	3.33	0.025	***	3.68
number of observations	45180						24338					
number of firms	6731						3891					

Table 2 continued

| | Business services | | | | | | | | | | |
| | (i) 0–249 employees | | | | | (ii) 1–249 employees | | | | |
	coeff.		z	m.e.		z	coeff.		z	m.e.		z
size 10–49	1.42	***	31.18	0.287	***	41.90	1.12	***	23.29	0.082	***	12.76
size 50–249	2.29	***	21.45	0.368	***	43.53	1.87	***	16.33	0.097	***	12.42
age: five years or younger	–0.22	***	–11.14	–0.055	***	–10.92	–0.16	***	–5.53	–0.017	***	–4.76
foreign-owned t–1	0.07		0.93	0.016		0.93	0.19	**	2.14	0.018	**	2.27
share of tertiary graduates t–1	0.22	***	7.41	0.055	***	7.47	0.14	***	3.12	0.014	***	3.12
log output per employees t–1							0.28	***	22.41	0.028	***	30.78
yr2003 (ref 2002)	–0.10	***	–3.74	–0.024	***	–3.71	–0.07	**	–2.08	–0.007	**	–1.97
yr2004	0.33	***	13.28	0.080	***	14.20	0.15	***	4.52	0.014	***	4.84
yr2005	0.17	***	6.90	0.042	***	7.11	–0.11	***	–3.26	–0.011	***	–2.94
yr2006	0.20	***	8.11	0.050	***	8.41	–0.07	**	–2.00	–0.007	*	–1.88
yr2007	0.37	***	14.39	0.089	***	15.67	0.13	***	3.94	0.013	***	4.23
yr2008	0.27	***	10.16	0.065	***	10.73	0.09	**	2.49	0.008	***	2.62
yr2009	0.13	***	4.74	0.031	***	4.85	–0.04		–1.26	–0.005		–1.21
yr2010	0.09	***	3.10	0.021	***	3.15	–0.05		–1.44	–0.005		–1.37
number of observations	190761						96382					
number of firms	27157						14654					

Notes: The table reports coefficients and marginal effects of the conditional logit model of the probability of exporting of SMEs in computer services (Nace rev. 1.1).

***, ** and * denotes significance at the 1, 5 and 10 per cent levels.

Source: Swedish ESLAIT data, Statistics Sweden, own calculations.

An increase in the share of university graduates by 10 percentage points leads to a rise in the probability of exporting by 0.16 percentage points. Firm age—measured as the dummy variable for SMEs five years or younger—is significant, suggesting that young micro enterprises in computer services are at a disadvantage in exporting. The results are similar for business services: The marginal effects of the log ratio of output to employees and the share of workers with a tertiary degree are 0.028 and 0.016, respectively, making them nearly identical to the findings for computer services. Unlike in the case of computer service firms, however, skill intensity remains significant at the one per cent level when the labour productivity measure is included.

The finding that highly productive SMEs are more likely to start exporting is consistent with the literature (see Lejárraga and Oberhofer, 2015 for French SMEs and Temouri et al., 2013 for SMEs in the three largest European countries, although both of these studies exclude micro enterprises). One new discovery is that more efficient producers' tendency to self-select into exporting also holds true for micro enterprises. However, the magnitude of the relationship is quite low, indicating that the increase in export participation is affected by several other factors, not all of which are measurable at the firm level. The importance of skill intensity in export decisions corresponds to previous studies on business service firms (see Eickelpasch and Vogel, 2011 for Germany and Lööf, 2010 for Sweden).

In order to investigate whether the results differ between micro enterprises and other SMEs, separate estimates for the conditional fixed-effects logit model are provided. For the group of micro enterprises, firm size and labour productivity are again positive and significant determinants of the probability of exporting (see Table 3). However, skill intensity only matters for micro enterprises in business services. Interestingly, the magnitude of the relationship between labour productivity and exporting does not differ much between SMEs with 10 to 249 employees and micro enterprises in the computer service industry. An increase in labour productivity by 10 per cent is associated with an increase in the probability of exporting by 0.23 percentage points for the total group of SMEs, and 0.16 percentage points for micro enterprises. In contrast, labour productivity does not play a significant role for larger business service SMEs (10–249 employees). The results clearly show that the link between both productivity and human capital and the decision to export differs between micro enterprises and other small and

Table 3: Determinants of exporting in Swedish micro enterprises and SMEs in computer and business services for the period 2002–2010

		Conditional logit model								
	Micro enterprises (0–9 employees)					**SMEs (10–249)**				
	Computer services									
	coeff.		z	m.e.		z	coeff.		z	m.e.		z
log employment	0.78	***	18.22	0.043	***	5.88					
size 50–249							0.58	***	2.92	0.097	**	2.19
age: five years or younger	−0.17	***	−2.68	−0.009	**	−2.18	−0.27	**	−1.99	−0.053		−1.57
foreign-owned t–1	−0.06		−0.35	−0.003		−0.34	−0.21		−1.00	−0.040		−0.91
share of tertiary graduates t–1	0.11		1.18	0.006		1.18			−0.41	−0.035		−0.39
log output per employees t–1	0.30	***	11.43	0.017	***	9.46	0.12		1.37	0.023	**	2.27
year dummies	yes						yes				
number of observations	18809						3695				
number of firms	3225						624				
	Business services									
	coeff.		z	m.e.		z	coeff.		z	m.e.		z
log employment	0.58	***	24.56	0.035	***	11.45					
size 50–249							0.40	***	3.31	0.091	***	3.37
age: five years or younger	−0.11	***	−3.45	−0.007	***	−3.07	−0.36	***	−3.77	−0.087	***	−3.53
foreign-owned t–1	0.11		1.02	0.007		1.06	0.23		1.32	0.054		1.36
share of tertiary graduates t–1	0.14	***	3.15	0.009	***	3.12	−0.42		−1.27	−0.100		−1.24
log output per employees t–1	0.33	***	24.17	0.020	***	18.73	0.05		1.12	0.012		1.21
year dummies	yes						yes				
number of observation	82527						9412				
number of firms	12937						1554				

Notes: The table reports coefficients and marginal effects of the conditional logit model of the probability of exporting of SMEs in computer services (Nace rev. 1.1). ***, ** and * denotes significance at the 1, 5 and 10 per cent levels. Time dummy variables are included but not reported. m.e. denotes the marginal effects.

Source: Swedish ESLAIT data, Statistics Sweden, own calculations.

medium-sized enterprises. This implies that the two groups are not only markedly different in their level of export participation, but also in the importance of the major determinants of their participation.

Another important result is that a small firm size remains a disadvantage in the exporting activities of SMEs, even when controlling for factors such as labour productivity and skill intensity. However, the strength of the firm size link decreases when controlling for labour productivity. For SMEs in computer services in particular, the marginal effect of the size class dummy of 0.094 means that SMEs with 10 to 49 employees are 10 percentage points more likely to export than are micro enterprises. The difference is identical between large SMEs and micro enterprises. This indicates that the gap in exporting between micro enterprises and small SMEs (those with 10 to 49 employees) is larger than between small and large SMEs. A possible explanation for the negative dependence of exporting on firm size is that micro enterprises have lower resource capacities in terms of finance, knowledge, and managerial experience.

The results of the standard logit model are provided for comparison. Table A4 in the appendix shows that the relationship between exporting and labour productivity is significantly overestimated when firm effects are not controlled for. This holds true for both computer services and business services.

5   Conclusions

This paper investigates the export behaviour of Swedish SMEs in the computer and business service industries based on unique and linked firm–level data covering the total population of firms (including micro enterprises) in these specific industries for the period 2002–2010. Micro firms account for more than 90 per cent of firms in these industries. Another advantage of the data is that unlike in trade statistics, there is no reporting threshold for exports. Furthermore, exports include both goods and services, and the availability of panel data makes it possible to control for unobserved firm heterogeneity.

Using a conditional logit model, we find that the export participation of SMEs in computer services is significantly and positively related to the lagged level of labour productivity and firm size. Workers with a tertiary degree play a minor role, while foreign ownership is not significant. Younger SMEs exhibit a significantly

lower export participation rate. Additionally, there are small differences between SMEs and micro enterprises in the relationship connecting labour productivity and exporting. For micro enterprises in other professional and business services, we find that large and more productive firms with a high proportion of employees with a tertiary degree are more likely to export. In contrast, the self-selection hypothesis can be rejected for SMEs with 10 to 249 employees. Overall, the magnitude of the relationship between exporting and productivity is quite small.

The finding that the probability of exporting is positively linked to the productivity level of firms indicates that general framework conditions are important in entering international markets. These framework conditions include lower costs of doing business and exporting, a flexible labour market, competitive product markets, and the presence of quality educational institutions. Improvements in these framework conditions may improve productivity. Meanwhile, the foreign market entry of micro enterprises is likely to depend on a mix of direct and indirect policies rather than on a single policy instrument. Export promotion measures (i.e. information services) and other indirect policies are also important.

The main limitation of this study relates to the lack of information on indirect exports. It is well known that micro enterprises often start their export activities through other firms. With regard to possible future work, an effort to estimate the determinants of export intensity would be of interest. Specifically, the two-part model makes it possible to jointly investigate the extensive margin (the decision to export) and intensive margin (the export share). Another avenue of research could involve exploring the determinants of exports outside of Europe, but this would require additional data on exports by destination. Finally, including framework factors such as the real exchange rate and the costs of exporting would be a further area of potential investigation.

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Table A1: Change in export participation of SMEs
based on VAT statistics in services industries

		2001	2010	Change in percentage
Nace rev 1.1		in percent		points
50	Sale, repair of motor vehicles	8.5	10.7	2.2
51	Wholesale trade	29.4	28.1	–1.3
52	Retail trade	9.1	8.2	–0.9
55	Hotels and restaurants	0.9	1.1	0.2
60	Land transport	10.4	10.7	0.3
61	Water transport	15.6	9.8	–5.8
62	Air transport	34.6	27.8	–6.8
63	Supporting transport activities	30.9	28.2	–2.7
64	Post and telecommunications	13.5	4.9	–8.6
65	Financial services	17.2	13.6	–3.6
67	Act. auxiliary to financial intermediation	20.3	10.1	–10.2
71	Renting	6.6	8.3	1.7
72	Computer services	9.0	12.9	3.9
73	Research and development	13.6	18.7	5.1
74	Other business activities	7.0	8.4	1.4
90	Sewage and refuse disposal	4.7	5.8	1.1
91	Activities of membership organizations n.e.c.	5.4	5.6	0.2
921t2	Motion picture and video activities , radio and television activities	13.6	14.6	1.0
923t7	Artistic activities, news agencies, library	2.8	5.7	2.9
93	Other service activities	0.5	0.9	0.4

Source: Statistics Sweden.

Table A2: Export participation based on trade and VAT statistics
in the Swedish business sector, 2010

Firm size (employees)	Number of firms	Number of exporters (goods & services)		Export participation in percent	
	SBS	Trade statistics	VAT data	Trade statistics	VAT data
0	740,840	7,404	20,489	1.0	2.8
1–9	226,967	19,086	34,433	8.4	15.2
0–9	967,807	26,490	54,922	2.7	5.7
0–249	1,001,049	37,231	69,228	3.7	6.9
1–249	260,209	29,827	48,739	11.5	18.7
10–249	34,240	11,494	15,087	33.4	44.1
250+	998	703	781	70.4	78.3
total	1,002,047	37,934	70,009	3.8	7.0

Note: Exports include both exports of goods and services not distinguished between Intra and Extra EU. SBS denotes structural business statistics.

Source: Statistics Sweden.

Table A3: Difference in gross output per employee and skill intensity
between exporters and non-exporters

	Computer services (Nace rev.1 72)			Business services (Nace rev.1 74)		
	Output per employee (in 1000 SEK) (means)					
	1–249	10–249	1–9	1–249	10–249	1–9
Non-exporting	626.2	907.3	612.3	605.1	667.6	601.3
Exporting	972.3	1106.9	908.4	1095.7	1209.6	1066.2
Export starters	796.6	997.9	757.4	893.7	911.8	891.2
	Output per employee (non exporting firms=100) (means)					
	1–249	10–249	1–9	1–249	10–249	1–9
Non-exporting	100.0	100.0	100.0	100.0	100.0	100.0
Exporting	155.3	122.0	148.4	181.1	181.2	177.3
Export starters	127.2	110.0	123.7	147.7	136.6	148.2
	Share of tertiary graduates in percent (means)					
	0–249	10–249	1–9	0–249	10–249	1–9
Non-exporting	30.6	36.7	30.5	29.4	21.5	29.6
Exporting	36.7	44.2	34.2	35.6	36.7	35.4
Export starters	34.9	42.4	34.0	35.7	31.4	36.0

Notes: Data pooled over the period 2001–2010.

Source: Swedish ESLAIT data, Statistics Sweden, own calculations.

Table A4: Determinants of exporting in Swedish micro enterprises and SMEs
in computer and business services for the period 2002–2010

	Standard logit model					
	Computer services					
	0–249			10–249			Micro enterprises 0–9	
	m.e.		z	m.e		z	m.e.		z
log employment t–1	0.152	***	37.32	0.063	***	3.88	0.153	***	24.57
age: five years or younger	0.021	**	2.51	–0.018		–0.67	0.025	***	2.79
foreign owned firms t–1	0.110	***	5.84	0.065	**	2.06	0.131	***	5.88
share of tertiary graduates t–1	0.018	*	1.67	0.208	***	4.47	0.004		0.33
log output per employees t–1	0.069	***	12.09	0.106	***	5.00	0.063	***	10.77
# of observations	9711			1391			8320		
	Other business services								
	0–249			10–249			Micro enterprises 0–9		
	m.e.		z	m.e.		z	m.e.		z
log employment t–1	0.077	***	27.39	0.072	***	7.54	0.079	***	40.91
age: five years or younger	0.004		1.20	–0.011		–0.69	0.002		0.67
foreign owned firms t–1	0.146	***	13.43	0.277	***	10.95	0.169	***	18.31
share of tertiary graduates t–1	0.038	***	8.77	0.273	***	10.83	0.053	***	12.12
log output per employees t–1	0.068	***	30.91	0.167	***	13.55	0.077	***	34.67
# of observations	46107			4199			41908		

Notes: The table reports the marginal effects of the standard logit model of the probability of exporting of SMEs in computer and other business services for the year 2010. ***, ** and * denotes significance at the 1, 5 and 10 per cent levels. m.e. denotes the marginal effects.

Source: Swedish ESLAIT data, Statistics Sweden, own calculations.