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SMEs, EXPORTS AND JOB CREATION: A FIRM-LEVEL ANALYSIS

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TABLE OF CONTENTS

ABSTRACT

The paper examines (i) the role and importance of innovative capabilities (on both the technological and commercial dimensions) as determinants of export performance and behaviour and (ii) the link between exports and job creation. Empirical data from a longitudinal survey of 3,032 manufacturing SMEs over a three-year period (1994-1997) indicate that these firms became increasingly active on foreign markets. Results from tobit and probit models also show that innovative capabilities are strong determinants of export performance and behaviour but their relative importance varies according to the knowledge intensity of the industrial sectors in which they are actively involved. In high-knowledge industries, all technological capabilities are significantly and positively related to export performance and behaviour, while commercial capabilities are more salient in low-knowledge industries. However, in either low-, medium- or high-knowledge industries, R&D and knowledge intensity remain among the five strongest determinants. This suggests that international competition is indeed knowledge-based. Finally, it is shown that an expansion in exports is associated with an increase in SMEs' workforce and that exports play a strong moderating role.

1. INTRODUCTION

Even though small and medium-sized enterprises' (SMEs) share of world trade still remains much lower than that of larger firms, numerous studies indicate that many SMEs are nevertheless very active abroad and rely increasingly on the development of foreign markets to ensure corporate growth. For instance, SMEs are "directly producing about 20 percent of OECD exports and about 35 percent of Asia's exports" (OECD, 1997, p. 7). A report issued by the U.S. Secretary of Trade and Commerce reveals that 70 percent of all exporting firms were small firms with fewer than 100 employees (Prozak, 1993). SMEs are also the fastest growing group of exporters in the United States (Axinn *et al.*, 1994, p. 49). The same trend is observed in Canada where the number of SMEs involved in export activities doubled in the six-year period from 1986 to 1992 (Industry Canada, 1996). In the future, SMEs are likely to be even more exposed to international competition (Reynold, 1997; OECD, 1997).

Considering the strategic role played by SMEs in industrialized economies, it appears essential to examine how they perform in international markets and how they can improve their export performance. With this first main objective, the paper focuses on determining the role of firm-specific factors in export activities and, in particular, the relative importance of technological and commercial capabilities as determinants of export performance. Since SMEs are considered a major source of new jobs in most economies, the link between export activities and job creation will also be investigated. Thus, our second main objective is to explore the role of export activities in new job creation in the specific context of SMEs. These two main goals will be pursued by analyzing empirical data from a longitudinal survey of 3,032 manufacturing SMEs over a three-year period (1994-1997).

2. THEORETICAL BACKGROUND

The chosen perspective is at the micro-business level and the unit of analysis is the individual firm.

The Importance of Firm-specific Factors as Determinants of Export Performance and Behaviour

This paper focuses strictly on firm-specific factors related to export performance. There is now an established body of literature that points to the overwhelming importance of firm-specific factors, on which competitive advantages are built (Amit and Schoemaker, 1993) and from which economic rents can be realized (Jacobson, 1988; Hansen and Wernerfelt, 1989). Several authors have found that firms differ widely within industries (Rumelt, 1991) with respect to either performance (Cool and Schendel, 1988), the enactment of technology policies and corporate strategies (Lefebvre *et al.*, 1997), or their use of technology (Davies, 1979; Baldwin and Rafiquzzaman, 1998). There is also convincing evidence that the firm-specificity of corporate applied R&D creates intra-industry differences (Helfat, 1994). The above studies are consistent with the resource-based view of the firm (Peteraf, 1993; Wernerfelt, 1984; Grant, 1991).

Within the theoretical perspective known as "the resource-based view of the firm", we will examine some firm-level determinants of export performance, and more specifically the role and importance of innovative capabilities. Capabilities refer to a firm's ability to deploy resources, where resources are defined as "stocks of available factors that are owned or controlled by a particular firm" (Amit and Schoemaker, 1993, p. 34). Capabilities are "more broadly based (than core competencies) encompassing the entire value chain" of a particular firm (Stalk *et al.*, 1992, p. 62). Since innovation depends on technological capabilities as well as other "critical capabilities in areas such as marketing and distribution" (Burgelman *et al.*, 1996, p. 8), innovative capabilities[1] will also include the commercial dimension.

Firms' Characteristics and Innovative Capabilities as Determinants of Export Performance and Behaviour

The literature on firm-level determinants of export performance and behaviour is extremely rich (see, for instance, Chetty and Hamilton, 1993, for a thorough review of the literature on the subject) and covers a wide spectrum of issues, such as the relative importance of firms' demographics (Bonaccorsi, 1992; Wagner, 1995), or the relative impact of the beliefs, attitudes and perceptions of the firm's top management (Bijmolt and Zwart, 1994). In the paper, we will

focus on capabilities as determinants of export performance and behaviour, but this focus does not eliminate the necessity to assess and control for the contribution of firms' characteristics to export entry and expansion.

Firms' characteristics

Although the traditional assumption that in order "to compete globally you have to be big" (Chandler, 1990) holds in several studies, a significant number of researchers have found no relationship, or a negative relationship, between *size* and exports (see, for instance, Calof, 1993). These ambivalent results may be partially explained by the non-linear nature of the relationship (Lefebvre *et al.*, 1998). Furthermore, it is quite possible that, above a certain threshold, size no longer plays a significant role. Evidence from Australia, Denmark, Italy, Japan and Spain supports this observation: size is of considerable importance during the first stages of internationalization but does not seem to be a significant factor afterwards (OECD, 1997). The overriding importance of relative size rather than absolute size may also explain these ambivalent results on the relationship between size and exports. Some smaller firms may well be important players in their own niche markets, whereas other SMEs find that they cannot compete with their larger rivals that have a dominant market position.

The relationship between *age* and exports may also produce conflicting results. On the one hand, mature firms may have accumulated considerable stocks of knowledge (Baldwin and Rafiquzzaman, 1998) and built strong core capabilities that allow them to better penetrate foreign markets. On the other hand, core capabilities can become core rigidities or competence traps (Leonard-Barton, 1992) and younger firms may be more proactive, flexible and aggressive.

Larger, more mature manufacturers rely on domestic SMEs to provide them with components and subsystems that are inputs to their own products. It is therefore expected that contractors will realize more direct export sales than subcontractors. *Manufacturing status* (contractor vs. subcontractor) should thus be retained as a firm characteristic that must be controlled for.

Many SMEs are not unionized but some are affiliated with various *trade unions*. Since it has been shown that strikes have a negative impact on trade performance (Greenhalgh *et al.*, 1994), trade union affiliations and their relationship to export performance need to be investigated.

From the above arguments, hypothesis 1 could be summarized as follows: *H1 - Firms' size, age, manufacturing status and presence of trade unions are characteristics that have to be controlled for when examining the relationships between capabilities and export performance and behaviour in the context of SMEs.*

Technological capabilities

Technological capabilities refer to "the firm's current ability and its future potential to apply firm-specific technology to solve technical problems and/or enhance the technical functioning of its production process and/or its finished products" (Nicholls-Nixon, 1995, p. 7). As competition is increasingly technology-based, it is expected that technological capabilities would play a major role in determining a firm's propensity to export. Kohn (1997, p. 50) strongly suggests that small exporters are able to compete on foreign markets because of their technological capabilities, but Sriram *et al.* (1989) observed a negative relationship between technology and exports, while Reid (1986) found no relationship. This warrants further investigation.

Among technological capabilities, in-house *R&D* not only generates innovations, but also allows firms to better assimilate external technological knowledge. R&D is therefore viewed as one of the prime factors influencing export performance. The positive relationship between R&D and exports in small firms has been demonstrated by Ong and Pearson (1984). Moreover, SME exporters conduct more R&D (Baldwin *et al.*, 1994) and produce more patents (Moini, 1995).

The adoption of advanced manufacturing technologies has long been recognized as a key factor in the competitiveness of manufacturing firms (Naik and Chakravarty, 1992), as these technologies allow for increased productivity, improvements in product quality or reductions in product rejection rates, all of which are essential on domestic and foreign markets. Benefits from automation increase both in scope and intensity and employees' skills are enhanced with increased technological penetration (Lefebvre *et al.*, 1995). In fact, the myth of deskilling following the adoption of new technologies has been strongly contested (Adler, 1986; Lefebvre *et al.*, 1996). An increased *level of automation* is thus viewed as an asset on foreign markets and this assumption is supported by the fact that flexible manufacturing technologies have been positively related to exports (MacPherson, 1994). Similarly, *modernization of*

machinery and equipment should also prove to be an asset if not an entry condition to operate in export markets.

Recognized *quality standards* are often mandatory for an SME to qualify as a potential supplier (Ferguson, 1996). International standards such as ISO 9000 are in most cases a prerequisite for export activities (Chetty and Hamilton, 1996). National or sector-specific technical standards, which are in some cases more stringent and more comprehensive than international standards, carry less and less weight as they create artificial barriers between countries, regions and industries. Over the last few years, ISO has definitely increased its dominating influence on industrial buying behaviour, although one can argue that ISO 9000 certification as the only “badge” of quality may in fact create market distortions. The relative impact of national and international quality standards on export performance will be examined.

One of the main drawbacks for SMEs is certainly the shortage of technological skills, and this was shown to be one of the strongest determinants of further advanced manufacturing technology adoption (Lefebvre *et al.*, 1996). This shortage can seriously hamper innovative capabilities. The number of engineers, scientists, and technicians reflects, to a great extent, a firm’s stock of technological knowledge, and its *technological knowledge intensity* is expected to be strongly related to its export performance.

Small firms are responsible for a disproportionately large number of technological innovations in industrialized nations (Pavitt *et al.,* 1987; Rothwell, 1988) and in newly industrialized countries such as Korea (Lee, 1995). They also act as vital agents in the diffusion of technology and their *unique know-how* is often based on the improvements they bring to generic technologies developed elsewhere. This unique know-how should be a strong determinant of export performance.

In light of the above discussion, the following hypothesis is proposed. *H2 - Technological capabilities, namely in house R&D, level of automation, degree of modernization of equipment/machinery, technical knowledge intensity, unique know-how and presence of quality standards are all positively related to export performance and behaviour in the context of SMEs.*

Commercial capabilities

Market intelligence (Czinkota, 1982) and marketing capabilities (Haar and Ortiz-Buonafina, 1995) are shown to be prerequisites to export entry and expansion. In a sample of new high-technology firms, Fontes and Coombs (1997) observed that small firms seem to be more able to overcome difficulties with technology than with the market. Since this sample was drawn from the information technology sector, there are some doubts as to whether this observation can be generalized. We will thus try to assess the relative contributions of a broader range of commercial capabilities to export performance, namely diversification, trademarks and/or proprietary products, networking in the form of commercial agreements with other firms, access to distribution, manufacturing agents, and import activities.

Exports by SMEs based on a diversification strategy (range of products and diversity of product lines) have proven successful (Namiki, 1988) and are a major factor in export growth (Denis and Depelteau, 1985). If a firm operates in a number of industries, the knowledge and experience acquired in one industry can be transferred to others, particularly with respect to commercial and competitive watch practices, which are highly related to export success (Christensen, 1991; Cafferata and Mensi, 1995). *Diversification* is thus assumed to contribute positively to SMEs' export performance, although this goes against the general tendency in recent years to reduce diversification and focus on core businesses (Markides, 1995), at least among large firms.

Competitive advantages drawn from a unique product (Cooper and Kleinschmidt, 1985; Haar and Ortiz-Buonafina, 1995) or product specificity (Julien *et al.*, 1994) are positively linked to export performance. The presence of *trademarks* and, more often, of *proprietary products* should therefore be an asset for SMEs operating in foreign markets.

While showing dynamism and willingness to engage in international activities, SMEs face serious difficulties: under-capitalization (Buckley, 1997), imperfect information and entry barriers erected by entrenched firms and by governments (Acs *et al.*, 1997) limit their international expansion. SMEs therefore turn to commercial agreements and strategic alliances with other domestic and foreign firms (*networking*) and rely on intermediaries (*distributors* and *manufacturing agents*) to enhance their export performance. The creation of marketing and distribution channels (Julien *et al.*, 1994) and export entry

based on intermediaries (Chetty and Hamilton, 1996) seem to sustain SMEs' international competitiveness.

Dealing beyond national frontiers is not limited to exports. In fact, *imports* allow SMEs to experience cross-border activities with minimal risks. To what extent this first-hand knowledge of international activities influences the export performance of SMEs seems to be unknown, although there is an implicit assumption that it could be an advantage.

A third hypothesis is thus proposed. *H3 - Commercial capabilities, namely diversification, the presence of trademarks and/or proprietary products, networking, access to distribution, the use of a manufacturing agent, and import activities are all positively related to export performance and behaviour.*

Exports and Job Creation in SMEs

SMEs employ a significant share of the active workforce in OECD countries. In the EU, for instance, SMEs account for 99.9 percent of all organizations and provide 72 percent of total employment (European Network for SME Research, 1997), although some employment share disparities can be observed among European countries (Albors and Kingham, 1998). In Japan, SMEs represent 99.5 percent of all establishments and 73.8 percent of the workforce (OECD, 1997). The role of SMEs in the U.S. economy cannot be underestimated: according to the Small Business Administration, 99.7 percent of all organizations are firms with fewer than 500 employees, which employ 54 percent of the U.S. workforce (SBA, 1997). In Canada, firms with less than 100 employees account for 99 percent of all businesses, while those with less than 500 employees represent 99.8 percent. Moreover, the latest statistics indicate that not only are SMEs increasingly vital to the Canadian economy, but the number of establishments increased by 29.7 percent and their share of employment rose from 44.5 percent to 49.5 percent over a ten-year period.

The economic importance of SMEs is not, however, restricted to the service or trade sector: they are making an increasingly important contribution to global manufacturing activities and their share of world manufactured exports is estimated at between 25 percent and 35 percent (OECD, 1997). They are also gaining employment share in the manufacturing sector. For example, although U.S. manufacturing SMEs employed only 24 percent of the manufacturing workforce in 1972, their share had risen to 33 percent

by 1987 and to 38 percent by 1991, according to the U.S. Bureau of the Census. Similar trends are observed for small Canadian firms over the last two decades in the manufacturing sector (Baldwin and Picot, 1995).

Theoretical Background – SMEs and their Role as Job Generators

The role of exports as a factor in job generation has not received much attention in the literature and the empirical evidence remains scarce, fragmented and even contradictory. Let us first briefly examine the role of SMEs as generators of net new employment, before discussing the role and impact of exports on job creation in the following sections. The persistent and relatively high unemployment rates observed in most OECD countries in the early 1990s placed employment issues at the heart of public policy (OECD, 1997; Schreyer, 1996), with the United States being singled out as the exception. Increasing attention is now being paid to SMEs as they are widely considered to be the principal generator of net new employment. Birch (1979) provided initial evidence of the predominant role of small businesses in job creation in the United States. Despite some misleading interpretations of the data,[2] there is a general consensus that small firms create most new jobs but also destroy most old jobs, that survival rates of new jobs fall sharply with size and that SMEs are more volatile than their larger counterparts.

Overall, official statistics support the positive role of SMEs with respect to job creation although it may sometimes be overestimated. In the United States, small-firm-dominated sectors created 63.6 percent of the 2.4 million new jobs in 1996, whereas large-firm-dominated sectors accounted for 18.2 percent of new jobs (SBA, 1997). Between the second quarter of 1996 and the second quarter of 1997, Canadian firms created 580,000 net new jobs and SMEs accounted for 81 percent of this net job growth[3] (Industry Canada, 1998).

Furthermore, empirical evidence from the literature supports the small business generator thesis: job creation rates fall with firm size in Australia (Williams, 1989), Canada (Picot *et al.*, 1994; Baldwin and Picot, 1995), Denmark (Leth-Sorensen and Boegh-Nielson, 1995), Finland (Lumme, 1996), Germany (Wagner, 1995), the Netherlands (Broersma and Gautier, 1997), Sweden (Davidson, 1995), the United Kingdom (Doi and Cowling, 1998; Gallagher *et al.*, 1990), and the United States (Davis *et al.*, 1994; Birch *et al.*, 1993); so do net job rates, according to most of these studies.

The Relationship Between Exports and Job Creation

At the macro-level of analysis, whether export expansion has a positive influence on economic growth is still very much debated. Economic growth could in fact cause export growth (see, for instance, Krugman, 1984). Recent studies testing the causal relationship between exports and economic growth (Jung and Marshall, 1985; Sharma *et al.*, 1991; Ghartey, 1993) have produced ambivalent results.

At the micro- or firm-level of analysis, exports may be seen as a means to create jobs through the growth of individual firms. Empirical evidence shows that SMEs with international activities experience stronger growth rates, estimated at two to three times the average for OECD economies (OECD, 1997). Exporting SMEs also tend to be more profitable than those confined to domestic markets. However, the link between exports and job creation remains underinvestigated and the limited empirical results obtained so far are fragmented: half of the Australian SMEs active in foreign markets have indicated that jobs were indeed generated by their international expansion (roughly 25 percent to 30 percent of their total employment), but no correlation was found between globalization and job creation in Greek firms with fewer than 50 employees (OECD, 1997). Thus, the role of exports as a factor in generating new jobs at the firm level needs to be investigated further.

The Moderating Role of Exports

There is, however, general agreement on the fact that export activities not only generate jobs (OECD, 1997; Czinkota *et al.*, 1992), but also enhance the performance of individual firms (Terpstra and Sarathy, 1994) and provide them with real competitive advantages. Exporting firms have to face international standards, introduce incremental technological innovations to their products in order to penetrate different markets, or change their marketing practices to adapt to the wider variety of expressed or latent needs of foreign customers. Experience of foreign markets, therefore, allows firms to improve their innovative performance and build on some of the technological and commercial capabilities that were essential to perform on foreign markets initially. This self-reinforcing phenomenon points to the potential synergy between the acquisition of capabilities and the increased experience of export markets, which leads to growth of the firm's workforce. To what extent changes in jobs (Δ jobs) are jointly determined by changes in technological and commercial capabilities (Δ capabilities) and changes in exports (Δ exports)

remains unknown. We will therefore build on the considerable knowledge gained from contingency theory and explore how the "coalignment", "fit" or "match" between two variables (Δ capabilities and Δ exports) is assumed to affect a third variable (Δ jobs).

The concept of fit is complex and can be classified according to six different perspectives, each of which corresponds to distinct conceptual and methodological approaches (Venkatraman, 1989). The arguments raised previously strongly suggest that there is a need to explore the moderating role of exports since moderation implies that the dependent variable (Δ jobs) is jointly determined by Δ capabilities (the predictor) and Δ exports (the moderator).

3. METHODOLOGY

Database and Procedures

The database used here is a subset of an existing database created and maintained for the purpose of offering contractors an inventory of available manufacturing capabilities within their region. It contains precious, detailed and up-to-date information on individual manufacturing firms acting as contractors or subcontractors.

To ensure the validity and reliability of the data used in the analysis, the following approach was taken:

(i) as 89 data fields exist for each firm, appropriate fields corresponding to the determinants identified previously were carefully selected;

(ii) each field was validated and coded for each firm; cross-validation within and between fields using computerized procedures was also carried out;

(iii) the data files were reprogrammed to permit the use of multivariate data analysis methods;

(iv) 100 firms were randomly selected and data were cross-checked through a telephone survey; as error rates were minimal (less than one tenth of one percent for all fields for all firms), it was assumed that the database was highly reliable.

The above procedure was followed first for 1994 and repeated for 1997. For 1994, the database had information on 3,289 manufacturing firms. In order to carry out a longitudinal analysis on exactly the same SMEs, two conditions were imposed:

(i) firms had to have fewer than 500 employees in 1994, which corresponds to the definition of SMEs as accepted by organizations such as the SBA (Small Business Administration) in the United States, the European Union, the OECD, Statistics Canada and Industry Canada; as a result, the sample size dropped slightly to 3,187 firms;

(ii) firms identified in (i) had to be present in both the 1994 and 1997 databases; the sample size fell again to 3,032 firms. Some 155 firms had therefore disappeared from the database in 1997 either because they went bankrupt or because they no longer wished to be included in the database.

All subsequent analyses were performed on these 3,032 firms.

Research Variables and their Operationalization

Figure 1 displays more information on the independent variables, namely firms' characteristics, technological capabilities and commercial capabilities.

Figure 1
Determinants of Export Performance and Behaviour:
Firms' Characteristics, Technological Capabilities,
and Commercial Capabilities

Determinants	Measures
Firms' characteristics	
Firm size	Annual sales; Number of full-time employees
Firm age	Number of years since the foundation of the firm
Manufacturing status	Subcontractor or contractor
Trade unions	Affiliation(s) with trade unions
Technological capabilities	
R&D	Presence or absence of R&D activities
Level of automation	Presence of CAD, CAM, CAE or any combination
Degree of modernization of equipment/machinery	Average age of equipment/machinery (up to a maximum of 13 machines or pieces of equipment)
Knowledge intensity	Number of full-time engineers and scientists
Unique know-how	Presence or absence of a specific, unique type of know-how (mainly directed to product and/or process innovations)
Quality standards	Presence or absence of the following quality standards: (ISO 9001, 9002, 9003, 9004; Z299.1, Z299.2, Z299.3, Z299.4; MIL-Q-9858, MIL-I-4520; AQAP-1, AQAP-4, AQAP-9; AS1821, AS1822; DND 1015, 1016; BNQ 220, 210, 200).
Commercial capabilities	
Diversification	Number of industrial sectors in which the firm operates (based on SIC codes)
Trademarks/proprietary products	Presence or absence of trademarks and/or proprietary products
Networking	Use of networks, alliances or other intercorporate agreements with other domestic or foreign firms
Access to distribution	Presence or absence of distributor(s)
Manufacturing agent	Presence or absence of manufacturing agent(s)
Import activities	Volume of imports by the firm

The database also provides factual information on sales made in the home province (Quebec), in other Canadian provinces, in the United States, in Europe, and in other countries. In the case of non-exporters, it also allows the identification of firms that would be interested in exporting. The above data provide all of the information needed to characterize each firm along the following process of internationalization: (i) non-exporters with no interest in exporting, (ii) non-exporters with an interest in exporting, (iii) domestic SMEs (with sales strictly in Canada), (iv) North American SMEs (active in Canada and the United States only) and (v) global SMEs (with sales in other foreign countries). This five-stage internationalization process[4] builds on previous work by Cavusgil (1980), Christensen (1991) and Kleinschmidt and Cooper (1995).

Finally, the database contains information on the total number of employees (full-time equivalent), as well as the number of administrative employees, production employees, engineers and technicians.

Potential Biases and Strengths of the Research Strategy

The use of an industrial database as a source of empirical evidence creates some biases that must be discussed before presenting the results. First, the database represents manufacturing firms engaged in subcontracting activities. Second, these firms have devoted time, effort and money to be included in this database: this indicates an emphasis on networking which is somewhat atypical of smaller firms. These two points generate the following biases:

(i) these firms are probably well established, more mature, more innovative, and more “networked”;

(ii) some industrial sectors may be over-represented while others could be under-represented;

(iii) the information contained in the database is useful for the allocation of subcontracting activities and is thus highly directed towards standards, specifications and machinery. Figure 1 shows, for example, that quality standards are well specified, whereas R&D activities are just treated as a bimodal variable with no indication of the nature of, or investment in, such activities. The authors have no control over these variables, as is always the case with secondary sources of data.

However, once the above biases have been taken into account, the database offers major strengths. First, it represents a unique source of longitudinal data taken from a rather large sample. With 3,032 firms (for 1994 and 1997), almost 33 percent of the province's manufacturing SMEs are represented. Second, the data are recent (1997). Third, the set of available variables displayed in Figure 1 is rather exhaustive and some of these variables have not been thoroughly tested in the literature.

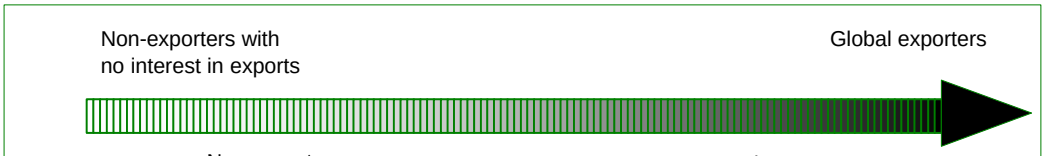
4. RESULTS

Profile of SMEs and their Internationalization Process

As suspected, the database presents some biases with respect to sectoral and size representation. SMEs from the food, beverage and tobacco industries, the textile and apparel industries, and the petroleum and coal products industries are totally absent, whereas some sectors, such as metal products, are over-represented (see the Appendix for the exact number of firms in the sample and the population). Size representation is also slightly biased: medium-sized firms are more likely to be present. This should be kept in mind when interpreting the results, and statistical analyses must take into account the industrial sector and firm size.

In 1994, more than half of SMEs were strictly confined to their local market, but the vast majority of these non-exporters showed some interest toward export activities (Figure 2). Around 11.5 percent of SMEs generated some sales in other Canadian provinces. The remaining firms (the “true” exporters) were either strictly active in North American markets (20.94 percent) or were selling beyond North America (17.15 percent).

Figure 2
SMEs and the Process of Internationalization



	Non-exporters		Active exporters		
	Non-exporters with no interest in exports	Non-exporters with an interest in exports	Exporters active in other Canadian provinces only	Exporters active in North-American markets only (USA and other Canadian provinces)	Exporters active beyond North-American markets
1994					
Number of firms	n_1 = 382	n_2 = 1146	n_3 = 349	n_4 = 635	n_5 = 520
Proportion of firms	12.60%	37.80%	11.51%	20.94%	17.15%
Average firm size (number of employees)	19	27	30	50	71
1997					
Number of firms	n_1 = 331	n_2 = 621	n_3 = 446	n_4 = 907	n_5 = 727
Proportion of firms	10.92%	20.48%	14.71%	29.91%	23.98%
Average firm size (number of employees)	20	31	36	69	140

From 1994 to 1997, there was a distinct evolution: the percentage of non-exporters fell sharply – from 50.4 percent to 31.4 percent – and, in 1997, the very same firms were much more active in foreign markets. In 1997, 1,634 firms had sales beyond their domestic market, compared to 1,155 firms in 1994 (Figure 2). There is no doubt that these SMEs became increasingly active in foreign markets during the three-year period.

However, Tables 1a and 1b show that the average volume of sales in the U.S. and foreign markets was rather modest in 1994 for all firms (8.01 percent and 3.41 percent, respectively – Table 1a), even for active exporters (16.16 percent and 6.87 percent, respectively – Table 1b). In 1997, these SMEs were much less dependent on their local market, but most would not qualify as extensive or fully globalized SMEs, as defined by the OECD (1997).

Table 1a
Mean Percentage of Sales by all SMEs in Various Markets, 1994 and 1997

	Average percentage of sales in:			
	Local markets (own province)	**Domestic markets (other Canadian provinces)**	**U.S. markets**	**Other foreign markets**
1994 n = 3,032	76.81%	11.77%	8.01%	3.41%
1997 n = 3,032	67.77%	15.72%	12.97%	3.54%

Table 1b
Mean Percentage of Sales by all Exporters in Various Markets, 1994 and 1997

	Average percentage of sales in:			
	Local markets (own province)	**Domestic markets (other Canadian provinces)**	**U.S. markets**	**Other foreign markets**
1994 n = 1,504	53.24%	23.73%	16.16%	6.87%
1997 n = 2,080	53.01%	22.92%	18.90%	5.16%

Determinants of Export Performance and Behaviour

In order to assess the contribution and relative importance of the various determinants, multivariate analyses were conducted. Tobit and probit models allow us to assess respectively (i) the explanatory power of the independent variables towards export performance (i.e. the percentage of sales realized by a particular firm on foreign markets), and (ii) the contribution of these independent variables to export behaviour (i.e. the probability that a firm will export). To begin with the interpretation of the outcomes, we will start the discussion with those variables that turned out to be non-determinants and were removed from all subsequent analyses as they only introduce “noise” and lengthen the presentation of statistical tables.

Independent Variables with No or Minimal Impact: Trade Unions, Technical Quality Standards and Degree of Modernization of Equipment

The fact that some variables are systematically not associated with any measure of export performance and behaviour is in itself a result.
The presence of trade unions is not related to export performance or to the probability of exporting, whether in larger or smaller SMEs, whether the firm is a contractor or a subcontractor, within all industrial sectors, or in 1994 versus 1997.[5] The presence of trade unions, which could raise cost-of-production factors (mainly salaries), does not seem to hamper exports.

The presence of national or industry-specific technical standards such as Z299, MIL, AQAP, AS, DND or BNQ gives ambivalent but mostly positive results. Although some of these standards are technically demanding, they remain less significantly related to export performance than ISO 9000.[6]
The adoption of the ISO 9000 series of standards by the major industrial nations and the increasing reliance on ISO certification as a screening device for potential subcontractors largely contributed to the above results. In fact, between 1994 and 1997, SMEs in our database adapted to this new reality as the number of firms with ISO certification more than doubled. Furthermore, there is a strong relationship between adherence to a technical standard and ISO certification, resulting in some multicollinearity problems. The predominance of ISO 9000 over national, sectoral or subregional standards in international markets receives here additional empirical support. As a consequence, only ISO certification will be included in the analysis.

The degree of modernization of equipment and machinery is not related to export performance[7]. In the context of SMEs, one would think that the presence of such important and capital-intensive physical assets would play a positive role on entry into foreign markets. The operational measure used for this variable (average age of all pieces of equipment) partially explains this surprising result: a firm with a large number of machines and other equipment could be penalized more than a firm that has only recently invested in a few machines. Thus, the degree of modernization of equipment/machinery was also removed from our set of independent variables. As a result, 14 independent variables were retained for subsequent analyses.

Relative Importance of Each Determinant of Export Performance and Behaviour

Tobit and probit models were performed on the data obtained from the same 3,032 manufacturing SMEs, first for 1994 and then for 1997 (Table 2). With one exception, all independent variables are positively related to the dependent variables both in 1994 and 1997 (Models 1, 2, 3 and 4). This reinforces our choice of innovative capabilities as determinants of export performance and behaviour. The only exception is diversification, which is negatively related to the percentage of sales made on foreign markets in 1997 (Model 3) and non-significantly related to the dependent variables (Models 1, 2 and 4). Hence, diversification does not seem to be an advantage on export markets, and SMEs, like larger firms, may do very well to concentrate on core products and competencies.

Do Determinants of Export Performance and Behaviour Differ over the Three-year Period?

In 1994, the strongest determinants of export performance (Model 1 in Table 2) were in decreasing order: size, import activities, R&D, knowledge intensity, and access to distribution. These five determinants are all significant at $p = 0.0000$. In 1997, (Model 3), the same five determinants ($p = 0.0000$) are present, although size now plays a slightly less important role: this may be explained by the fact that an increasing number of SMEs in our sample have grown in size and are more active on foreign markets.

Table 2
Determinants of Export Performance and Behaviour
(n = 3,032)

	1994		1997	
Dependent variable	**Percentage of sales in foreign markets**	**Probability to export**	**Percentage of sales in foreign markets**	**Probability to export**
Models	**Model 1 (tobit)**	**Model 2 (probit)**	**Model 3 (tobit)**	**Model 4 (probit)**
Constant	-49.98 ****	-1.47 ****	-31.83 ****	-1.24 ****
	(-17.29)	(-20.45)	(-12.88)	(-13.82)
Firms' characteristics				
Firm size	0.14 ****	0.004 ****	0.02 ****	0.0004 **
	(8.87)	(7.67)	(5.91)	(2.38)
Firm age	0.01	0.002 *	0.03	0.005 ***
	(0.24)	(1.36)	(0.87)	(3.26)
Manufacturing status	0.83	0.03	8.67 ****	0.20 ***
	(0.36)	(0.50)	(4.72)	(2.65)
Technological capabilities				
R&D	18.16 ****	0.50 ****	14.55 ****	0.49 ****
	(8.18)	(8.48)	(8.16)	(7.59)
Level of automation	0.76 **	0.03 ***	1.33 ****	0.01 ****
	(1.95)	(2.58)	(4.67)	(2.91)
Knowledge intensity	0.83 ****	0.01 ***	0.82 ****	0.04 ***
	(5.98)	(3.27)	(6.89)	(4.02)
Unique know-how	7.09 ***	0.21 ***	6.70 ****	0.21 ***
	(2.91)	(2.88)	(3.94)	(3.05)
Quality standards	6.41 *	0.09	7.79 ***	0.24 ***
	(1.58)	(0.71)	(3.54)	(2.51)
Commercial capabilities				
Diversification	1.08	0.03	-0.51	0.06
	(1.20)	(0.57)	(-0.67)	(0.96)
Trademarks	6.12 ***	0.15 ***	3.23 **	0.14 **
	(3.00)	(2.64)	(1.95)	(2.22)
Networking	2.22	0.08 ***	2.12 *	0.05 **
	(1.08)	(3.21)	(1.30)	(1.77)
Access to distribution	7.52 ***	0.17 ***	8.25 ****	0.28 ****
	(3.52)	(2.76)	(4.90)	(4.12)
Manufacturing agents	7.14 ***	0.25 ****	7.80 ****	0.33 ****
	(3.21)	(3.97)	(4.52)	(4.72)
Import activities	17.72 ****	0.54 ****	14.86 ****	0.52 ****
	(8.44)	(9.52)	(9.23)	(8.72)
Log likelihood	-6784.72	-1627.33	8981.44	-1684.03
(χ^2_{14})	748.54	775.96	863.10	816.79
Level of significance, χ^2	p = 0.00	p = 0.00	p = 0.00	p = 0.00

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; **** $p < 0.0001$.

The probability that SMEs will export is significantly influenced by two overriding factors, namely import activities and R&D (Models 2 and 4 in Table 2). Larger firms are also more likely to export, but size, once again, is less significant in 1997. The presence of manufacturing agents as well as knowledge intensity influence positively and very significantly the probability of exporting, both in 1994 and 1997.

Overall, we can observe an evolution in the relative importance of the determinants of export performance and behaviour over the three-year period. With the exception of size and trademarks, most determinants play a more significant and positive role in 1997:

(i) this is particularly evident for variables associated with the anticipated characteristics of firms conducting business in a knowledge-based and networked economy (Lefebvre *et al.*, 2000), namely knowledge intensity, level of automation, unique know-how and networking;

(ii) determinants related to the very practical, down-to-earth issues faced by SMEs are also stronger in 1997; this is the case for variables such as the access to distributors, the presence of manufacturing agents and the adherence to quality standards (i.e. ISO 9000, which is increasingly considered as the international mark of recognition in foreign markets).

Do Variables that Explain Export Intensity Differ from Those Influencing the Probability to Export?

Surprisingly, the answer is no: significant determinants are strikingly identical, although if we place them in decreasing order of importance the ranking is slightly different. The only exception is the firm's age, which is not related to export performance (Models 1 and 3 in Table 2) but influences significantly the probability to export (Models 2 and 4 in Table 2). A firm's age may indeed reveal its stability, its maturity and the accumulation of knowledge stocks needed to undertake initial export activities, but age does not explain significantly the expansion of export activities.

Determinants of Export Performance in High-, Medium- and Low-knowledge Industries

In order to further investigate the relative importance of innovative capabilities, we have pooled the different industrial sectors into high-, medium- and low-knowledge industries.

In 1997, SMEs in low- and medium-knowledge industries shared the same five strongest determinants of export performance (import activities, R&D, knowledge intensity, access to distribution, and size). These five determinants of export performance are the same factors that influence positively and significantly the probability to export in medium-knowledge industries. In low-knowledge industries, age (not size) seems to predict significantly the likelihood that a firm will export. Table 3 clearly demonstrates the predominance of technological capabilities over commercial capabilities as determinants of export performance and behaviour in SMEs of high-knowledge industries: all technological capabilities are significantly and positively related to both dependent variables (Models 5 and 6 in Table 3). Since high-technology exports have grown faster than other types of products and services (OECD, 1997), special attention should be paid to ensure that SMEs continue to build their technological capabilities.

Exports and Job Creation

In order to examine the relationship between exports and job creation, we will consider, for the same firms, changes in the volume of export sales (Δ exports) between 1994 and 1997 and changes in the number of full-time jobs (Δ jobs) over the same period.

Relationship Between Exports and Jobs: Preliminary Empirical Evidence

Table 4 gives first-hand basic information on the relationship between exports and jobs by showing simple frequencies from the cross-tabulation between Δ exports and Δ jobs. The vast majority of SMEs experienced export expansion (44.3 percent) or export stability (42.3 percent), whereas many SMEs simultaneously increased or maintained their workforce (49.4 percent and 24.4 percent, respectively). The link between exports and jobs is significant ($\chi^2 = 270.34$; D.F. = 4; p = 0.0000).

Table 3
Determinants of Export Performance and Behaviour in Low-, Medium- and High-knowledge Industries[1] (n = 3,032)

	Low-knowledge industries $n_1 = 736$		Medium-knowledge industries $n_2 = 1,724$		High-knowledge industries $n_3 = 376$	
Dependent variable	**% of sales in foreign markets**	**Probability to export**	**% of sales in foreign markets**	**Probability to export**	**% of sales in foreign markets**	**Probability to export**
Models	**Model 1 (tobit)**	**Model 2 (probit)**	**Model 3 (tobit)**	**Model 4 (probit)**	**Model 5 (tobit)**	**Model 6 (probit)**
Constant	-30.20 ****	-1.26 ****	-35.18 ****	-1.29 ****	-7.76	-0.89 ***
	(-5.55)	(-7.65)	(-11.31)	(-12.02)	(-1.08)	(-3.43)
Firms' characteristics						
Firm size	0.01***	0.08	0.03 ****	0.003 ****	0.04 ***	0.005 ***
	(2.65)	(0.23)	(5.64)	(5.91)	(2.40)	(2.67)
Firm age	0.14 *	0.01 ***	0.06	0.003 *	0.15 **	0.001
	(1.58)	(3.42)	(1.28)	(1.63)	(1.71)	(0.34)
Manufacturing status	7.12 **	0.20 *	6.71 ***	0.04	-4.49	-0.07
	(1.69)	(1.46)	(2.76)	(0.43)	(-1.05)	(0.45)
Technological capabilities						
R&D	13.56 ***	0.45 ****	16.84 ****	0.58 ****	8.33 **	0.55 ***
	3.57)	(3.95)	(7.51)	(7.50)	(1.94)	(3.51)
Level of automation	0.88 *	0.05 **	1.49 ****	0.04 ***	2.92 ****	0.06 **
	(1.29)	(2.14)	(4.26)	(2.88)	(3.88)	(2.14)
Knowledge intensity	1.66 ***	0.05 ***	0.65 ****	0.008 *	0.69 **	0.03 **
	(3.11)	(2.52)	(4.50)	(1.39)	(2.01)	(1.90)
Unique know-how	2.85	0.23 *	5.73 ***	0.12 *	12.27 ***	0.41 ***
	(0.65)	(1.61)	(2.73)	(1.53)	(2.87)	(2.48)
Quality standards	1.42	0.24	8.61 ***	0.06	11.51 **	0.45 **
	(0.23)	(1.06)	(3.32)	(0.54)	(2.12)	(1.84)

[1] The groupings of industrial sectors are representative of the classification used by Lee and Haas (1996). Similar results are obtained using the OECD classification (OECD, 1997).

Table 3 (cont'd)

	Low-knowledge industries $n_1 = 736$		Medium-knowledge industries $n_2 = 1{,}724$		High-knowledge industries $n_3 = 376$	
Dependent variable	**% of sales in foreign markets**	**Probability to export**	**% of sales in foreign markets**	**Probability to export**	**% of sales in foreign markets**	**Probability to export**
Models	**Model 1 (tobit)**	**Model 2 (probit)**	**Model 3 (tobit)**	**Model 4 (probit)**	**Model 5 (tobit)**	**Model 6 (probit)**
Commercial capabilities						
Diversification	-3.15 **	-0.03	0.45	0.06 **	-2.40	0.12 *
	(-1.73)	(-0.52)	(0.49)	(1.69)	(-1.18)	(1.55)
Trademarks	0.16	0.03	2.55	0.21 ***	-1.68	-0.12
	(0.05)	(0.29)	(1.22)	(2.77)	(-0.36)	(-0.74)
Networking	2.48	0.18 **	2.06	0.05	7.65 **	0.21
	(0.68)	(1.66)	(1.00)	(0.73)	(1.71)	(1.19)
Access to distribution	10.03 ***	0.31 ***	8.19 ***	0.19 **	5.59	0.12
	(2.80)	(2.75)	(3.65)	(2.14)	(1.10)	(0.69)
Manufacturing agents	8.20 **	0.32 ***	7.82 ***	0.37 ****	6.68 *	0.25 *
	(2.17)	(2.58)	(3.51)	(4.12)	(1.46)	(1.42)
Import activities	21.61 ****	0.68 ****	12.59 ****	0.49 ****	3.56	0.11
	(6.11)	(6.32)	(6.21)	(6.66)	(0.83)	(0.69)
Log likelihood	-2073.26	-400.40	-4852.83	-911.94	-1377.63	-211.52
χ^2_{14}	176.99	209.73	566.26	520.31	84.98	85.16
Level of significance (χ^2)	p = 0.00	p = 0.00	p = 0.00	p = 0.00	p = 0.00	p = 0.00

*p < 0.10; ** p < 0.05; *** p < 0.01; **** p < 0.0001.

Table 4
Relationship Between Δ Exports and Δ Jobs

		Δ Exports			
		Contraction	**Stability[1]**	**Expansion**	**Total**
Δ Jobs	Decrease	181 (6.1%)	313 (10.5%)	286 (9.6%)	780 (26.1%)
	Stability[1]	61 (2.0%)	457 (15.3%)	212 (7.1%)	730 (24.4%)
	Increase	159 (5.3%)	493 (16.5%)	825 (27.6%)	1,477 (49.4%)
	Total	401 (13.4%)	1,263 (42.3%)	1,323 (44.3%)	2,987 (100%)[2]

[1] Stability is defined here as –1% ≤ Δ exports or Δ jobs ≤ +1%; expansion is defined as > +1% and contraction as < –1%.
[2] Some 45 firms did not indicate the number of full-time employees in 1994 or 1997; the total sample size therefore drops to 2,987 firms.

Two interesting observations can be made in Table 4. On the one hand, of the 1,323 SMEs that experienced export expansion, more than 62.24 percent (825 SMEs) increased their workforce, while only 21.62 percent (286 firms) reduced it. This strongly confirms the positive relationship between export growth and job growth in manufacturing SMEs (test of proportions, $p = 0.0000$). On the other hand, of the 401 SMEs whose exports contracted, 181 (45.14 percent) reduced their workforce, while 159 (39.65 percent) increased it – probably through the growth of "true" domestic sales and/or indirect exports (i.e. sales subsumed in an end-product exported by a larger firm). This supports a positive but non-significant link between export contraction and job destruction ($p = 0.1219$, level of significance for unilateral tests of proportion). Let us now examine the strength of the relationship between exports and jobs using absolute values instead of frequencies.

Strength of the Relationship Between D Exports and D Jobs

Table 5 indicates an overall strong positive and significant relationship between Δ exports and Δ jobs: all correlation coefficients[8] are highly significant. They are stronger in small firms than in medium-sized firms and in low-knowledge industries than in high- or medium-knowledge industries. Stronger correlation coefficients indicate here that changes in jobs are more sensitive to changes in exports: they do not assess the performance of firms in different sub-samples. In other words, a contraction in exports is related to a reduction in the workforce while an expansion in exports is associated with an increase

in the workforce. Hence, jobs in low-knowledge industries are simply more sensitive to changes in exports than they are in medium- and high-knowledge industries.

Table 5
Strength of the Relationship Between Exports and Jobs by Firm Size and Industrial Sector

	Correlation coefficients (unilateral tests)	n
All firms	0.32 (p = 0.000)	3,032
Firm size:		
Small firms	0.33 (p = 0.000)	2,607
Medium-sized firms	0.25 (p = 0.000)	425
Industry:		
High-knowledge industries	0.26 (p = 0.001)	376
Medium-knowledge industries	0.34 (p = 0.000)	1,724
Low-knowledge industries	0.46 (p = 0.000)	736

Table 6 goes one step further and tries to assess the strength of the relationship between Δ exports and Δ jobs of different types. Strong and positive relationships exist for the 3,032 manufacturing SMEs when administrative and production employees are considered ($r = 0.28$, $p = 0.000$; and $r = 0.34$, $p = 0.000$, respectively). However, no significant relationship is found for either engineers or technicians ($r = 0.00$, $p = 0.466$; and $r = 0.02$, $p = 0.275$, respectively). This latter result must be interpreted with caution since some subgroups of manufacturing SMEs such as medium-sized firms, and firms in high-knowledge industries show a stronger positive relationship between Δ exports and the change in the number of engineers and technicians.

The results presented in Table 6 are much more demanding than those of Table 5 because jobs are placed in different categories for different sub-samples. However, they show that fluctuations in export activities are much more closely linked to fluctuations in the number of production employees and, to a slightly lesser extent, to fluctuations in the number of administrative employees. This seems to hold for all SMEs except those in high-knowledge industries.

Table 6
Strength of the Relationship Between Exports and Job Categories by Firm Size and Industrial Sector

	Correlation coefficients (unilateral tests)			
	Administrative employees	**Production employees**	**Engineers**	**Technicians**
All firms	0.28 (p = 0.000)	0.34 (p = 0.000)	0.00 (p = 0.466)	0.02 (p = 0.275)
Firm size:				
Small firms	0.28 (p = 0.000)	0.34 (p = 0.000)	0.01 (p = 0.448)	0.02 (p = 0.363)
Medium-sized firms	0.08 (p = 0.149)	0.15 (p = 0.018)	0.04 (p = 0.319)	0.12 (p = 0.066)
Industries:				
High-knowledge	0.06 (p = 0.256)	0.08 p = 0.180)	0.16 p = 0.071)	0.12 (p = 0.121)
Medium-knowledge	0.32 (p = 0.000)	0.33 (p = 0.000)	0.03 (p = 0.120)	0.01 (p = 0.420)
Low-knowledge	0.47 (p = 0.000)	0.43 (p = 0.000)	0.00 (p = 0.480)	0.01 (p = 0.446)

The Moderating Role of Δ Exports on the Relationship Between Δ Capabilities and Δ Jobs

The effect of Δ exports as a moderator on the form of the relationship between Δ capabilities (i.e. changes in technological and commercial capabilities between 1994 and 1997) and Δ jobs is simply assessed by performing moderated regression analyses (Tables 7 and 8). Table 7 summarizes the results of these analyses. Model 1 represents a multiple regression[9] analysis where Δ jobs is the dependent variable and Δ capabilities (i.e. upgrading or downgrading of capabilities between 1994 and 1997) and Δ exports are the independent variables. In Model 1, Δ capabilities and Δ exports are called the main effects. Interaction effects or cross-product terms (Δ capabilities x Δ exports) are added to the main effects in Model 2. The presence of a moderating effect is confirmed when the addition of the interaction effects leads to a significant increase in the explained variance (ΔR^2)[10]. A closer look at the bottom line of Table 7 reveals a very significant moderating effect (the ΔR^2 are fairly large and, in all cases, p = 0.0000). Further, Δ exports plays a more influential moderating role in small firms than in medium-sized firms.

Similarly, Table 8 demonstrates that Δ exports is a moderator playing a more influential role in medium- and high-knowledge industries than in low-knowledge industries. This suggests that the synergy between the acquisition of capabilities and the increased experience of export markets is less evident in low-knowledge industries. Ultimately, the gap between low- and medium- or high-knowledge industries may widen.

Table 7
The Moderating Role of Exports on the Relationship Between Δ Capabilities and Δ Jobs in All SMEs by Firm Size

	All SMEs	Small firms	Medium-sized firms
Model 1: Δ capabilities, Δ exports	R^2 = 0.2162 (p = 0.0000)	R^2 = 0.3238 (p = 0.0000)	R^2 = 0.2439 (p = 0.0000)
Model 2: Δ capabilities, Δ exports, Δ capabilities x Δ exports	R^2 = 0.5633 (p = 0.0000)	R^2 = 0.7938 (p = 0.0000)	R^2 = 0.3639 (p = 0.0000)
ΔR^2 (Model 2 vs. Model 1)[1]	ΔR^2 = 0.3471 (p = 0.0000)	ΔR^2 = 0.4760 (p = 0.0000)	ΔR^2 = 0.1200 (p = 0.0000)

[1] Level of significance for the F-test: $F = \dfrac{\Delta R^2 / M}{(1 - R^2) / (n - k - 1)}$

where M is the number of independent variables added from Model 1 to Model 2,
n is the number of respondents and *k* is the number of variables in Model 2.

Table 8
The Moderating Role of Exports on the Relationship Between Δ Capabilities and Δ Jobs in High-, Medium- and Low-knowledge Industries

	High-knowledge industries	Medium-knowledge industries	Low-knowledge industries
Model 1: Δ capabilities, Δ exports	R^2 = 0.2482 (p = 0.0000)	R^2 = 0.2395 (p = 0.0000)	R^2 = 0.2870 (p = 0.0000)
Model 2: Δ capabilities, Δ exports, Δ capabilities x Δ exports	R^2 = 0.5724 (p = 0.0000)	R^2 = 0.7680 (p = 0.0000)	R^2 = 0.3614 (p = 0.0000)
ΔR^2 (Model 2 vs. Model 1)[1]	ΔR^2 = 0.3242 (p = 0.0000)	ΔR^2 = 0.5285 (p = 0.0000)	ΔR^2 = 0.0744 (p = 0.0000)

[1] Level of significance for the F-test: $F = \dfrac{\Delta R^2 / M}{(1 - R^2) / (n - k - 1)}$

where M is the number of independent variables added from Model 1 to Model 2, *n* is the number of respondents and *k* is the number of variables in Model 2.

Overall, the results presented in Tables 7 and 8 confirm the role of Δ exports as a strong moderator:[11] the combination of increased export activities and continuous acquisition of technological and commercial capabilities leads to stronger job growth (the opposite proposition also seems to hold true: the joint influence of export contraction and downgraded capabilities is associated with a reduction in the number of jobs). This mutually reinforcing phenomenon is extremely important because it is deeply rooted in organizational learning and knowledge creation, and ultimately constitutes a key sustainable competitive advantage.

5. CONCLUSION

Brief Summary of Main Results

The results of the longitudinal survey of manufacturing SMEs reported in this paper have allowed us to examine the internationalization process of 3,022 SMEs over a three-year period (1994-1997) and the role of three categories of determinants of export performance and behaviour, namely firms' characteristics, technological capabilities and commercial capabilities. These results demonstrate that most determinants in all three categories play a significant role. As a consequence, our hypotheses – H1, H2 and H3 – received overall strong support. Yet, out of the sixteen determinants, four did not show a positive relationship as had been hypothesized. These are:

(i) the presence of trade unions, technical quality standards (with the exception of ISO 9000) and the degree of modernization of equipment, which were found to have no or minimal impact on exports; and

(ii) diversification, which is negatively related to export performance.

The strongest determinants are: import activities, R&D, access to distribution, knowledge intensity, and size (the latter for export performance). Determinants also vary according to the industrial sector. In high-knowledge industries, technological capabilities are strongest while some commercial capabilities are more salient in low- and medium-knowledge industries. In either low-, medium- or high-knowledge industries, R&D and knowledge intensity remain among the five strongest determinants of both export performance and behaviour. This suggests that international competition is indeed knowledge-based.

Our findings also show that the relationship between exports and job creation is positive over the three-year period (1994-1997) in our sample of 3,032 manufacturing SMEs :

(i) the positive relationship between Δ exports and Δ jobs is confirmed;

(ii) this positive relationship is strongest, or most sensitive, in small firms and in low-knowledge industries, and it affects production employees more than other categories of employees;

(iii) Δ exports acts as a moderator on the relationship between Δ capabilities and Δ jobs more strongly in small firms and in medium-knowledge

industries. This indicates a mutual reinforcement effect between increased export activities and the continuous acquisition of technological and commercial capabilities, leading to higher job growth.

Implications

The focus of this paper is on SMEs. This does not imply, however, that we downplay the crucial role of larger firms. As a matter of fact, large dynamic firms have been, and are, responding to competitive (international) pressures by reducing organizational slack, retrenching on core competencies and disposing of uncompetitive assets or operations. In doing so, they have received bad press, especially as generators of jobs, but in reality they are contributing to the economic expansion of smaller firms since SMEs are absorbing the results of the downsizing of large firms. Furthermore, dynamic large firms, and multinationals in particular, often "serve as international conduits for innovations of smaller firms" (Acs *et al.*, 1997)[12] and definitely play a major direct and positive role in vertically integrated sectors. Let us simply state here that the lack of dynamic, competitive large firms could adversely affect SMEs; the reverse proposition is equally true.

These results have implications for academic researchers, CEOs, managers and practitioners, as well as public policy makers; in some cases, they challenge widely accepted propositions. The following discussion is organized around some of the issues raised by the empirical evidence.

Issue 1: The Hidden Export Potential of SMEs

Despite an impressive and diversified literature on SMEs, gaps in our empirically-based knowledge seem to exist with respect to the export performance and behaviour of SMEs. In fact, "very little is known about the process by which SMEs participate in the global economy" (Acs and Preston, 1997, p. 2). The empirical evidence presented in this paper shows that many SMEs are indeed capable of sustaining international competition by building strong technological and commercial capabilities. According to the OECD, SMEs are not yet involved in the global economy to their full potential. Thus, we require:

(i) a more accurate assessment of the current and future contribution of SMEs to the global economy. This assessment should encompass

indirect exports (sales to a domestic customer whose products are exported) and focus not only on manufacturing firms but on services;[13]

(ii) the identification of SMEs with a strong export potential based on the most salient capabilities needed on international markets, given that persistent real differences in capabilities have proven to be comparative advantages on export markets. Some encouraging facts emerge from the empirical evidence presented here: an increasing number of SMEs are entering the international scene and, once they have started to export, they continue to progress toward the more advanced stages of globalization. There is no sign of "de-internationalization", or regression to the less advanced stages. The main purpose is to target SMEs with the most potential and to design policies and programs accordingly.

Issue 2: The Positive Bias Towards High-tech and High-knowledge-based Industries

Are we suffering from "high-tech snobbery"?[14] There is a general tendency to focus on high-tech (OECD, 1997) and high-knowledge-based sectors (Lee and Haas, 1996). Concerns with these sectors are omnipresent in the research community[15] as well as in public policy agencies.

Technological capabilities are powerful determinants of export performance and behaviour but so are commercial capabilities and continuous efforts at innovativeness in the non-technological dimensions. This suggests that building stronger technological and non-technological capabilities may be more important than operating in a high-knowledge sector**.** The following courses of action could be envisaged:

(i) Close monitoring of firms in the low- and medium-knowledge industries. Key to their competitiveness in foreign markets is the effectiveness with which they apply and use the full spectrum of their technological skills. Promotion of "high-tech SMEs" in the low- and medium-knowledge industries could be one of the ways to ensure visibility and create "a bandwagon effect" for other firms. The need to stimulate technological innovation is indeed greater than ever in all sectors, including low- and medium-technology sectors.

(ii) Continued strong support for the international activities of SMEs in low- and medium-knowledge industries. Empirical evidence shows that R&D

and knowledge intensity are indeed strong determinants of export performance and behaviour in these industries, where firms tap into specialized skills and gain knowledge from different foreign environments. During the internationalization process, organizational learning occurs, more advanced or specialized skills are sought, and firms become more knowledge-intensive.

Issue 3: The Neglected Role of Established SMEs

The literature displays a positive bias towards start-ups and spin-offs. There is an even stronger bias in favour of new technology-based firms (this is obviously linked to issue 2), especially in the biotechnology and information technology sectors (Hoffman *et al.*, 1998). As a result, we have gained considerable knowledge of these firms but we know little about established SMEs, which have generally not been examined by researchers (for an exception, see North and Smallbone, 1996). In most countries, government assistance programs, incentives and tax measures reflect similar biases.

Are government export assistance programs more cost-effective[16] among established SMEs than among younger firms? Are the competitive advantages gained by established SMEs from their experience of foreign markets more sustainable? It would certainly be worthwhile to provide more definitive answers to these questions.

Issue 4: Tailored Government Export Assistance Programs

There is a general consensus that export assistance programs should be tailored to the needs of SMEs. Barriers to entry in foreign markets are "systematically higher for smaller firms than they are for larger firms" (Acs *et al.*, 1997): shortages of capital and management skills (Buckley, 1997), imperfect information (Acs *et al.*, 1997), and entry barriers erected by entrenched firms and governments. Although assistance programs do exist, they are still not well enough known and used by SMEs (Moini, 1998). Furthermore, they are not specifically designed to correspond to the needs of firms as they move along the different stages of the internationalization process. Increased attention could be paid to the continuous improvement of technological and commercial capabilities.

The four issues discussed above are highly interrelated. All four point to the same conclusion: exports by SMEs from all sectors of economic activity should be heartily encouraged since they strengthen existing capabilities and contribute to the acquisition of new competencies and skills.

Issue 5: SMEs and Exports

An expansion in exports is generally associated with an increase in an SME's workforce. This is a major observation since reducing a high unemployment rate is certainly among the primary objectives of public policy makers. But beyond generating employment, SMEs with export activities offer better jobs in terms of quality, durability and specialization. This strongly suggests that export assistance to SMEs should receive continued attention. Moreover, in low- and medium-knowledge industries, they provide work to low-skilled labour. This is crucial for two main reasons. First, the low-skilled labour force faces ever more difficult prospects in the immediate future. However, SMEs with export activities in low- and medium-knowledge industries provide jobs even to people lacking basic numeracy and literacy skills. Although labour policies aim to upgrade these workers' skills and to prevent young people from entering the labour market without basic minimum competencies, low-skilled labour does and will continue to contribute to high long-term unemployment rates. As a result, small- and medium-sized exporters in low- and medium-knowledge industries may very well be helping to stave off a collapse of the demand for low-skilled labour. Second, the skill structure of the workforce is changing. The shift is clearly towards knowledge-intensive industries. However, this might be considered "job swapping" rather than job creation. For instance, software, computer and telecommunications specialists, as well as other highly paid professionals in low-tech industries have no problem finding other challenging jobs offering very high wages in high-tech industries: they are in demand in most sectors of economic activity.

So far, the mobility of labour has been rather limited, at least when compared to that of goods, services and capital. SMEs at more advanced stages of globalization could very well generate jobs abroad, especially in less-developed economies offering low wages. No clear indication of this phenomenon is yet observed since very few SMEs are fully globalized. Nevertheless, the movement of jobs towards export markets will have to be investigated in the context of SMEs.

This paper is intentionally focused on established SMEs. It demonstrates that these firms not only have a low exit rate but are also becoming increasingly globalized and, in so doing, are generating jobs. There is strong indications that the contribution of mature exporting SMEs to employment growth cannot be overlooked.

NOTES

1 This is in line with the following: innovative capabilities can be defined as the comprehensive set of characteristics of an organization that facilitate and support innovation strategies (Burgelman *et al.*, 1996, p. 8).

2 Misleading interpretations of the data arise from (i) the size distribution fallacy, as firms change size categories from year to year, (ii) the regression fallacy, or regression to the mean bias, which occurs with transitory fluctuations, (iii) the use of unsuitable databases such as the Dun & Bradstreet Market Identifier, which is not designed to track jobs. See Davis *et al.* (1994), Baldwin and Picot (1995), and Kirchhoff and Greene (1998) for a thorough discussion.

3 However, when one excludes self-employment, small and medium-sized firms represent 35.05 percent of this growth, compared to 21.17 percent for larger firms, and relatively few firms in all size groups are responsible for both job creation and job destruction (Picot and Dupuy, 1998).

4 The degree of internationalization of a firm is a multifaceted concept (Ramaswamy *et al.*, 1996), and export performance represents only one dimension, albeit important, of this concept. Even when considering strictly the export performance dimension, numerous export development models exist (Leneidou and Katsikeas, 1996). Some are based on the successively greater commitment of resources to foreign markets (Johanson and Wiedersheim-Paul, 1975), the notion of psychological distance (Bilkey and Tesar, 1977), the notion of passive vs. active exporters, or reactive vs. active exporters (Cavusgil, 1980 and 1982), or the degree of control exercised by exporters on overseas operations (Wortzel and Wortzel, 1981). Other models are simply based on the level and frequency of export activities (Rao and Naidu, 1992), or of trade activities (OECD, 1997). For instance, Rao and Naidu (1992) consider that firms go through several stages from non-exporters to failed exporters, first-time exporters, expanding exporters and continuing exporters. An index of globalization ranging from 1 (domestic SMEs) to 10 (fully globalized SMEs) was proposed very recently by the OECD based on the volume of traded inputs and outputs as well as the geographic coverage of these activities (OECD, 1997, p. 23). The five-stage internationalization process proposed here is simply based on the volume and destination of sales. Non-exporters (stages 1 and 2) are local SMEs whose sales are confined to one province. Domestic firms (third stage) have some extraprovincial sales, but no sales outside Canada; interstate or interprovincial “exports” are considered a first and crucial step for SMEs before they engage in

"real" exports (Christensen, 1991, p. 52). Proximate export markets (third stage) are markets not too distant on geographical and/or psychological grounds: the United States, which has historically been by far Canada's largest trading partner, is considered a proximate export market. Finally, exports to other foreign countries (fourth stage) are viewed as more demanding than exports to U.S. markets and are a better indicator of the export performance of Canadian firms (Porter, 1991). Empirical evidence also shows that global markets require more substantial efforts than North American markets (Lefebvre *et al.*, 1998).

5 Some 54 tobit models and 54 probit models were tested and the level of significance for this variable never went below $p = 0.10$.

6 Tobit and probit models tested the relative importance of each technical standard (presence or absence of Z299, MIL, AQAP, AS, DND, and BNQ) for larger and smaller SMEs, subcontractors and contractors, each industry, and for 1994 and 1997. As an alternative solution, the level of severity of all possible standards was introduced, but with less success than the simple presence or absence of ISO 9000.

7 It is insignificant in 97 out of 108 models.

8 Since correlation coefficients (r) and regression coefficients (β) share an identical test in bivariate regressions, only correlation coefficients are shown here.

9 If tobit models were appropriate, they are no longer necessary here since the distribution of the dependent variable is not truncated and follows a fairly normal distribution (Kolmogorov-Smirnov test). The same remark applies to Δ exports and Δ capabilities.

10 Problems of multicollinearity arise from the introduction of interaction effects. Stepwise multiple regressions were performed to reduce the number of variables (and therefore the number of potentially correlated variables); the results were similar but the R^2 are slightly lower.

11 Since Δ exports is significantly related to Δ jobs (Table 5), it cannot be considered a pure moderator, but is rather a quasi-moderator. By definition, a pure moderator interacts with predictor variables but has

no relationship or a negligible relationship with the dependent or criterion variable.

12 The authors add the following comment: “Because of the greater scale and scope of multinational firms’ global markets, the small innovative support firms can earn greater returns, and they do not even have to spend resources to overcome barriers against international expansion themselves!” (Acs *et al.*, 1997, p. 14).

13 The internationalization process for business service SMEs has received much less attention in the literature than that of manufacturing SMEs (for an exception, see O’Farrell *et al.*, 1998).

14 This expression was used by Van Hulst and Olds (1993) in their provocative analysis of the alleged exclusion of small countries from high-technology sectors.

15 For instance, Hoffman and his co-authors arrive at the following conclusion based on their thorough survey of the British literature on SMEs and innovation over the past decade: there is an “over-concentration of the SME research community in a fairly narrow set of technology-intensive and new technology-based sectors, most notably biotechnology and, to a lesser extent, IT. (For example, 80 percent of the case studies with a high-technology focus in our review are concerned with these sectors).” (Hoffman *et al.*, 1998, p. 41).

16 There seems to be contradictory evidence. On the one hand, new firms show high exit rates (Kirchhoff and Greene, 1998) and, in many cases, a vast amount of effort, resources and capital is wasted. On the other hand, mature firms seem to lose their ability to innovate, especially large established firms (Leavy, 1997). Furthermore, in the case of subsidies for job creation, grants (capital grants, project grants, rent assistance) are more effective in small firms, but only those which are new or relatively new.

APPENDIX
Number of SMEs by Industrial Sector: Population vs. Sample

	Population[1]	Sample[2]
Food, beverages and tobacco	733	–
Rubber	–	30
Plastic products	274	285
Leather and other related products	95	17
Textiles	355	19
Apparel	1,218	–
Wood products	1,030	226
Furniture	549	224
Paper and related products	115	52
Printing and related industries	1,331	36
Metals (first transformation)	53	86
Metal products	1,259	973
Machinery	402	270
Transport equipment	238	217
Electric and electronic products	293	295
Non-metallic mineral products	315	64
Petroleum and coal products	27	–
Chemical products	261	106
Other manufacturing industries	–	133
TOTAL	9,306	3,032

[1] Official statistics: 1993 data (MICST, 1997).
[2] Self-reported by SMEs.

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