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Market experiences and export decisions in heterogeneous firms

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Abstract

This empirical analysis focus on the impact of firm characteristics, firms' export experiences and location-specific variables on export decisions in Swedish manufacturing firms. Three choices of export market participation are considered: permanent export, occasional export and no export. The paper also analyzes firms' choice of expanding export activities. The empirical results indicate that firm-level variables such as size, human capital intensity and labor productivity increases the probability of a firm being a permanent exporter rather than an occasional or non-exporter. Moreover, firms located in regions with a high concentration of other firms exporting commodities in the same product group have a higher probability of both permanent and occasional export market participation. The results also show a significant positive effect of firms' export experiences in the previous period on the probability that a firm becomes a permanent exporter in the current period. The analysis of export market expansion suggest that firms with high human capital intensity and experiences from exporting several products to several markets are more likely to introduce a new export product. The probability of expanding to new geographical markets seems to be increasing with firm-level labor productivity and export experiences from multiple markets in previous periods.

Keywords: export behavior, firm heterogeneity, learning-by-exporting, experiential knowledge, knowledge spillover, agglomeration economies

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1 Introduction

In the process of globalization of production and trade more and more firms enter foreign markets to explore business opportunities abroad and to compensate for shrinking domestic sales in face of growing import competition. Despite many push and pull factors, however, many firms do not participate in international markets, and the majority of firms that do, export only few products to a limited number of destinations (Andersson et al. 2007; Bernard et al. 2007). The fact that not all firms exploit business opportunities in foreign markets can be explained by a fixed investment required to establish an export link. A growing vein of theoretical and empirical literature focuses on the effects of fixed export market entry costs on firms' export behavior¹. Theoretical and empirical works in this field suggest that only the most productive firms can overcome the fixed cost of export market entry. According to this view, the best firms self-select into export market participation.

Previous studies of firms export behavior find that firm characteristics such as size, productivity, human capital, R&D investments and age are important predictors of a firm's export status at a given point in time (Bernard et al. 1995, 1999, 2004; Baldwin et al. 2003; Clerides et al. 1998; Roberts et al., 1997). Moreover, several studies show that firms' export status display a significant persistence from one year to another (Roberts et al. 1997; Bernard et al. 2004; Esteve-Pérez, 2006). These findings are consistent with theoretical models by Dixit (1989) and Krugman (1989) proposing that the existence of sunk costs leads to persistence in firms' export behavior. Still, Bernard et al. (2004), Esteve-Pérez (2006) and Alvarez (2007) show that a substantial fraction of firms are not exporting on a permanent basis but enter, exit and re-enters on export markets from year to year. Alvarez (2007) finds significant productivity differences between firms that export occasionally and firms that are permanent exporters. Alvarez (2007) also finds a significant influence of previous export experience on the probability of becoming a permanent exporter. These empirical results suggest that there is a difference in export strategy between permanent exporters and sporadic exporter and that the firms' previous export experiences are decisive for successful export market participation. The purpose of this paper is to explore these issues further.

The first objective of this analysis is to examine if decisions about export market participation in Swedish firms are influenced by the same factors as those determining export behavior of

¹ See Greenaway and Kneller (2007) and Wagner (2007) for an overview of theoretical and empirical literature in this field.

firms in other countries. On average, Swedish manufacturers are more export oriented than are manufacturing firms in most other countries² and previous studies indicate that productivity levels have smaller impact on firms' export decisions in countries where the export market participation rate is comparably high (ISGEP, 2008). A high export market participation rate is likely to be an indication of a relatively low export market entry cost. In this case the productivity threshold for export market participation is low and productivity differences between exporters and non-exporters are, accordingly, small. Cross-country differences in export market participation rates can also be explained by differences in the size of the domestic market. If the domestic market is very small a major share of all firms has to sell their products also in foreign markets in order to reach the minimum efficient scale of production. Moreover, scale economies imply that small economies have to be open to import. A result of the open trade regimes and the high propensity of firms to participate in international markets that generally characterizes small economies may be a reduction in the cost of entering foreign markets. This reduction in entry cost may be due to institutional factors (low trade barriers) or due to external flows of knowledge and information about foreign markets across firms. Of particular interest in this context, are the studies by Greenaway et al. (2005) and ISGEP (2008) that find no significant productivity differences between exporters and non-exporters in Sweden. However, these studies make no distinction between permanent and occasional exporters and the first aim of this paper is to analyze if differences in firm-level productivity can explain the choice of permanent, occasional or no export activity in Swedish manufacturing firms.

The high degree of export market participation among Swedish firms highlights the potential for knowledge and information spillovers from and across exporting firms. As argued by Chaney (2006) and Andersson (2007), a substantial part of the fixed costs of establishing trading links is associated with the cost of acquiring knowledge about specific geographical product markets. Since knowledge is, at least partially, a public good that may spill over between economic agents, an individual firm's export decisions are likely to be influenced by the export activities going on in other firms. Several empirical studies (Alvarez, 2007; Chevassus-Lozza et al. 2003; Barrios et al. 2003; Aitken et al. 1997; among others) have investigated the possibility of localized knowledge and information spillovers from domestic and multinational exporters. The results from these studies are, however, mixed and

² ISGEP (2008) reports an export market participation rate of 83 % in the Swedish manufacturing sector and the average export intensity (export value as share of the value of total sales) in those firms are 44 %. Corresponding figures for other countries included in the ISGEP study ranges between 30 – 81 % in export market participation

inconclusive, which motivates further analysis. Hence, the second purpose of this study is to examine if firms' choices of export status is influenced by export decisions in neighboring firms.

The third objective of this paper is to analyze the impact of another source of knowledge on firms' export behavior, namely the experiential knowledge that the firm accumulates when entering several geographical product markets. In fact, only a small fraction of non-exporting firms do enter into export markets in subsequent periods³. Moreover, Swedish firm-level data reveal that firms that are already exporting are those that introduce most new export products and undertake most entries into new geographical export markets. These observations motivate a specific focus on the probability of a firm expanding its export activities to additional products and/or additional geographical destination markets. This study examines the importance of export market experiences in previous periods for the successful introduction of new export products and the successful establishment of a new geographical export link. This issue has not been targeted in previous empirical research of firms' export behavior. Accordingly, this study contributes to the existing literature on firms' export behavior by examining factors influencing the decision not only to participate in export markets but also the decision to expand export activities to comprise new products and/or new geographical markets.

The paper starts with a presentation of the synthesis of previous theoretical and empirical research on the determinants of firm-level export market participation and associated influences from agglomeration economies in Section 2. This section also presents the hypotheses to be tested in this paper and the econometric methodologies used to test these hypotheses are described in Section 3. Section 4 presents some descriptive statistics over the export behavior of Swedish firms followed by a presentation and discussion of the results from discrete choice model estimations in section 5. Concluding remarks are summarized in Section 6.

rate and 18 – 60 % in firm-level export intensity.

³ In a comparative study on the relationship between export and productivity, including firm-level evidences from 14 countries, ISGEP (2008) finds that firms that enter the export market after being a non-exporter during 3 years constitute a fraction that is generally less than 10 percent.

2. Productivity and Firms' Export Behavior – Stylized Facts and New Hypotheses

Exporters are usually considered to be highly productive firms for, at least, three reasons. First, international markets are regarded as more competitive than domestic markets, implying that only the most efficient firms can survive in international markets. Second, when selling on foreign markets exporting firms generally incur higher transport and transaction costs. Third, participation in international markets makes firms more easily aware of innovations and technological development taking place abroad and by assimilating new knowledge gathered in international markets exporters may strengthen their position in both domestic and foreign markets. These influences of foreign market participations suggest that exporters are more productive than non-exporters. In this section the literature on export and productivity is briefly reviewed.

Self-selection and learning-by-exporting

The theoretical literature on productivity differentials between exporting and non-exporting firms has mainly focused on two alternative (but not mutually exclusive) explanations. The first explanation points to self-selection of more productive firms into export markets. As the costs of selling goods abroad are higher than for domestic sales, export activities are profitable only for the most productive firms (Bernard et al. 2003; Melitz, 2003; Helpman et al. 2004; Yeaple, 2005). The additional costs associated with foreign sales consist of fixed export link investments as well as a per unit transaction cost, including transportation, tariffs etc. These costs provide an entry barrier that less productive firms have difficulties to overcome. Hence, *ex-ante* productivity differences between firms can partly explain why some firms export and others do not. Prevailing theoretical models of self-selection thus assume that firm-level productivity is exogenously given and no attention is given to the possibility of a causality running from export to firm-level productivity⁴.

The second explanation to observed productivity differences between exporters and non-exporters points to the role of *learning-by-exporting*, i.e. the causality between export market participation and firm-level productivity. The focus in this approach is on differences in productivity growth rates between exporters and non-exporters. The learning-by-exporting

⁴ Still, the already classical model by Melitz (2003) predicts that an increase in the export market participation rate results in increased productivity at the aggregate industry level.

approach explains the higher productivity levels observed among exporters with the growth in productivity that is the result of export market participation. The higher productivity growth in exporting firms arise due to increased production scale, knowledge and technology transfers from foreign buyers and competitors and increased competition in international markets (Girma et al., 2004; Kostevc, 2009). These effects improve the productivity performance of firms, *ex-post* export market entry.

Empirical testing of the self-selection and learning-by-exporting hypotheses, using longitudinal micro-level data, has resulted in amazingly strong evidences of the self-selection hypothesis⁵. Exporters tend to have higher pre-entry productivity levels and also higher pre-entry productivity growth rates than firms that do not enter foreign markets. These results hold also after controlling for observed firm characteristics (size, industry, capital- and skill intensity) and lead to the conclusion that it is the most productive firms that sell abroad. Evidences supporting the learning-by-exporting hypothesis are somewhat more mixed: post-entry differences in productivity growth rates are significant in some studies, but when matched firms are compared differences are most often not significant. Hence, current evidences tell us that export market participation does not necessarily improve firm performance.

Explanations to Self-Selection

The conventional theoretical explanation to self-selection into export markets is that export market entry requires some fixed export link investments. This investment is associated with marketing and search for new customers, development of new distribution channels, adjustment of products to foreign product standards and market-specific customer preferences etc. In the presence of entry costs, only the most productive firms will make profits when selling abroad, which explain the observed *ex-ante* productivity differences between exporters and non-exporters. Moreover, if these link investments are sunk they provide an explanation to the observed high degree of persistence in firms' export status (Roberts et al. 1997; Bernard et al. 2004; Esteve-Pérez, 2006). If sunk entry costs are present firms will continue to export to a given market even if there is a negative exogenous shock in order to avoid paying the entry cost once more.

⁵ See Greenaway and Kneller (2007) and Wagner (2007) for a survey of empirical results.

An interesting observation made by Alvarez (2007) is that only a limited number of exporting firms in Chile are permanent exporters, whereas the majority of exporters enter and exit the export market from year to year. This finding is incongruous with the theoretical conjecture that fixed entry costs are sunk, thereby causing persistence in export market participation. The findings made by Alvarez (2007) rather indicate that the export behavior among the majority of exporting firms is stochastic. Hence, a critical issue concerning the self-selection process is whether the *ex-ante* higher productivity of export starters is due to an exogenous random shock, originating from a favorable exchange rate, decreased domestic input prices etc, or the result of a planned business strategy. As argued by López (2005 p. 624) “*the self-selection process may well be a conscious decision by which firms purposefully increase their productivity with the clear intention of becoming exporters.*”

Empirical results presented by Hallward-Driemeier et al. (2002) have similar implications. Using plant-level data for five Asian countries, these authors find that those firms that started to export in the same year as the firm was established were significantly more productive than firms that *became* exporters after having served only the domestic market for some period before export market entry. Hallward-Driemeier et al. (2002) interpret these results as an indication of that the initial market orientation of the firm (i.e. export- or domestic market orientation) influences the firm’s investment decision in an early stage of firm development. According to Hallward-Driemeier et al. (2002), the incentives to invest in productivity improvements originate from the higher returns available in international markets rather than the higher competitive pressure in those markets. However, López (2003, 2005) argues that the intense competition in international markets, both in terms of product prices and product attributes, requires of the successful exporter to be closer to the technological edge than are non-exporting firms or firms exporting occasionally. As a consequence, permanent exporters have higher productivity and are able to make positive profits on their export sales in all periods. Occasional exporters, on the other hand, are firms that only sell on foreign markets when the conditions on those markets are relatively favorable compared to the conditions on the domestic markets.

Another explanation to different productivity trajectories between permanent exporters and occasional exporters may be the magnitude of the fixed export link investments required for becoming a permanent exporter compared to becoming an occasional exporter. It is likely that firms that successfully penetrate foreign markets have to make substantial link investments,

which are sunk in nature, whereas the link investments made by sporadic exporters are comparably small, allowing a stochastic rather than strategic export. Under such circumstances, the cost of exiting foreign markets is significant for an export-oriented firm addressing the export market in all periods, but negligible for a domestically oriented firm that only exports when the conditions in foreign markets are unusually favorable. This would result in a higher degree of persistence among firms that are export-oriented. In other words, the size of the sunk link investments is dependent on the firm's export strategy, which in turn, reinforces export-oriented firms' persistence in export markets.

Moreover, the export behavior of firms is likely to depend also on industry-specific factors, such as scale economies, market structures and the type of goods produced. In some industries the efficient scale of production is so large that the domestic market is too small for all firms in the industry, implying that the degree of export market participation among firms in such industries is very high. Limitations of domestic demand may also force firms in industries producing certain investment goods, for example some types of industrial machinery or transport equipment, to participate in foreign markets. Another industry characteristics that may affect firms export decisions are the R&D intensity and incidence patents in the industry. In industries where innovations and product development are crucial for firms' survival, firms tend to make large investments in R&D. When these activities result in commercial products the firm achieves some temporary monopoly power, which may be prolonged by patents. In order to maximize monopoly profits firms strive to limit the quantity supplied on a given geographical market and instead increase production scale by penetrating many markets.

In sum, the self-selection process can be due to sunk entry costs or strategic business planning or a combination of both. The interesting observation is that there is an anticipated difference in productivity trajectories between permanent and occasional exporters, where the latter may have more in common with non-exporters. If the establishment of a permanent export link requires larger investments than temporary export market participation, permanent exporters are expected to have higher productivity than have occasional exporters and non-exporters.

Entry costs, knowledge and learning-effects

Several scholars have pointed out that a substantial fraction of the cost of establishing a new export link is associated with the gathering of knowledge and information about various characteristics of specific geographical product markets and the search for new customers and distributors in these markets. Geographical markets are not homogenous and differ in consumer preferences, statutory product standards, price levels, import tariffs, transport and communication infra structure etc. For each aggregate group of products or sectors there are some general market characteristics, which are sometimes global and sometimes specific for a given geographical market. Still, firms in most manufacturing sectors produce products that to some degree are differentiated from varieties produced by other firms in the industry. Consequently, the market that each firm faces with each of its product varieties has some characteristics that are of unique relevance for the individual product variety and firm and some characteristics that are relevant for an aggregate group of product varieties and an aggregate group of firms (sector). These features of product markets imply that knowledge that is internal as well as external to the individual firm may influence the size of the cost of entering new markets and thereby affect firms export decisions.

Focusing on firms' internal knowledge related to foreign market conditions and business practices, this market or business knowledge can be regarded as a necessary factor for a successful exploitation of profit opportunities abroad. As argued by Johanson and Vahlne (1977; 1990) the relevant market knowledge is to a great extent of experiential nature and acquired from participation in international markets. When entering a new market, firms face uncertainty that is caused by the lack of experiential market knowledge. By the process of establishing export links and operating in foreign markets, firms accumulate knowledge and experiences that reduces this uncertainty and facilitate the introduction of new products and establishment of new export links. As a consequence, there may be a learning-by-exporting effect that reduces the cost of penetrating new export markets. This implies that the fixed cost of establishing an additional export link is a decreasing function of the firm's internal knowledge about foreign markets. Evidences of significant positive effects of experiential knowledge found with regard to firms' export intensity (Majocchi et al. 2005) and with regard to the performance of firms' offshore subsidiaries (Carlsson et al. 2005). In the context of export market participation, such learning-by-exporting effects of firms' previous export experiences are expected to influence both the probability that firms operate on established

export links and firms' decisions about export market expansion.

Another important feature of knowledge and information as input factors is that they in some respect can be regarded as public goods that may spill over between economic agents (Romer, 1986). In the context of export market participation such spillover effects imply that firms' export decisions may be influenced by the export behavior of neighboring firms. The origin of this external knowledge can be other trading firms (exporters and importers) or multinational firms, which possess knowledge and information about foreign markets. External knowledge flows from these sources may reduce the export market entry costs for other firms.

Case studies of export behavior suggests that firms that penetrate foreign markets reduce entry costs for other firms, either through knowledge spillovers or by establishing commercial links or distribution infra-structure that can be shared with other firms (Aitken et al. 1997). Yet, empirical evidences are not conclusive. Aitken et al. (1997) and Alvarez (2007) find positive effects on the co-agglomeration of domestic and multinational firms on the probability of a domestic firm being an exporter, implying that multinational enterprises may act like an export catalyst, reducing the cost of foreign market entry for other firms. Alvarez (2007), Chevassus-Lozza et al. (2003) and Clerides et al. (1998) find that the regional concentration of export in an industry stimulates the export market participation rate among firms in that industry and region. However, Aitken et al. (1997), Barrios et al. 2003 and Bernard and Jensen (2004) find no indications of localized spillovers among domestic exporters. As existing empirical results are mixed and inconclusive a fourth hypothesis to be tested in this paper is that knowledge spillovers from other exporters stimulate export market participation and export market expansion.

Hypotheses about firms export behavior

Summarizing previous theoretical and empirical works on the relationships between firm-level productivity and export behavior one may conclude that firms' export decisions can be random or strategic. This induces an anticipated difference in productivity performance across firms with different export behavior. Moreover, there may be learning-effects from export market participation that influences the cost of establishing or intensifying export links. In view of this, firms' previous export experiences are likely to influence firms' current export decisions. Firms

may also learn from experiences made by other exporters, implying that the export decisions in one firm may be influenced by export experiences made by neighboring firms. These theoretical arguments are summarized in four testable hypotheses:

1. Permanent exporters have higher initial productivity levels than have occasional exporters and non-exporters.
2. Experiences from in occasional export market participation in one period increase the probability of a firm becoming a permanent exporter in the next period.
3. The probability of a firm expanding its export activities to new product varieties or new geographical markets increases with previous export experience.
4. Firms' export decisions are influenced by the export activities in neighboring firms.

In the sequel of this paper these hypotheses are on Swedish micro data on manufacturing firms.

3 Methodology

Dynamic models of export market participation assume that a firm facing the discrete choice of exporting or not exporting will choose to export if the expected present value of exporting exceeds the expected present value of not exporting (Roberts and Tybout, 1997). In order to test the hypothesis that productivity differences can explain firms' export status, the subsequent analysis follows a variant of this approach, used by Alvarez (2007). This approach assumes that firms' choose to participate in the export market throughout the time-sequence that maximizes the present value of expected profits. Focusing on three different time-sequences, firms' choice set consists of three choices: exporting in each year over the whole period, exporting only in those years where exogenous factors make expected profits from exporting higher than the expected profits from selling the output on the domestic market, or not exporting in any year during the whole period. As the econometrician typically cannot observe *ex-ante* profit expectations, firms' *ex-post* export behavior is the only observable variable. Denoting the observed export status over the period 1997 – 2004 by $k \in K = \{1, 2, 3\}$, then, *ex-post* we may assume that a profit maximizing firm has chosen a sequence of participation $j \in K$ whose expected profits exceed the expected profits of any other alternative k :

$$\Pi^j(v^0, z_r) > \Pi^k(v^0, z_r), \quad j \neq k, \quad j, k \in \{1, 2, 3\} \quad (1)$$

where the expected profits (Π) is a function of initial firm characteristics, v^0 , and some locational-specific factors exogenous to the firm, z . Assuming a reduced form of the expected profit function associated with each alternative:

$$\Pi^k(v^0, z_r) = \beta_k' X + \varepsilon_k \quad (2)$$

where X is a vector containing firm- and location specific explanatory variables and ε is an error term, assumed to be identically and independently distributed and following an extreme value distribution. With this assumption the model is a well-known multinomial logit, giving the probability of firm i , located in region r choosing alternative k by:

$$\Pr(k_i = k | v_i^0, z_r) = \frac{\exp(\beta_k' X)}{\sum_{k=1}^3 \exp(\beta_k' X)} \quad (3)$$

By estimating this multinomial logit model we may test hypothesis 1, i.e. whether initial firm characteristics can explain firms' export behavior.

In order to examine the influences of firms' previous export experiences on current export decisions, the data set is divided into two periods so that the impact of the observed export status in the first period on export decisions in the second period can be analyzed. This issue is investigated through two complementary approaches. First, we examine if firms that have some export experiences in period 1 are more likely to become successful (permanent) exporters in period 2 (hypothesis 2). Second, we investigate the impact on previous export experiences, on the probability that a firm expands on foreign markets, either by introducing new export products or by penetrating new geographical markets (hypothesis 3).

The second hypothesis is tested by estimating the impact of the observed export status in the first period on the probability of a firm changing from not being a permanent exporter in period 1 to becoming a permanent exporter in period 2. Consequently, only firms that are non-exporters or occasional exporters in period 1 are included in this regression. In accordance with the discussion in section 2, we expect sunk market entry costs to be negligible when exporting occasionally, implying that the expected profits for a firm that do not export

permanently are independent of any occasional export activities in coming periods. However, the cost of establishing a permanent export link is expected to be significant, but possibly smaller, for firms that have some previous experience from selling to foreign market. Hence, the probability of becoming a permanent exporter hinges upon the expected profits from investing in a permanent export link compared to the expected profits from not doing so. This implies that the relevant choice context is the binary discrete choice of becoming a permanent exporter or not in the second period. This binary choice setting takes the form:

$$y_{i,t} = \begin{cases} 1 & \text{if } \Pi_{i,t}^{y_i=1}(v_{i,t-1}^0, \Delta v_{i,t-1}, z_r, k_{i,t-1}) > \Pi_{i,t}^{y_i=0}(v_{i,t-1}^0, \Delta v_{i,t-1}, z_r, k_{i,t-1}) \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

where the expected profit functions, as in equation 1, is assumed to depend on initial firm and location characteristics (v_0, z_r) but also on the change in firm characteristics over period 1 (Δv_{it-1}) and on the firm's export status in period 1, k_{t-1} . The export status in the first period is controlled for by a dummy variable taking the value 1 if the firm is an occasional exporter in period 1 and zero otherwise. The variables reflecting the change in firm characteristics is included to control for improvements in firm performance that would stimulate export market participation, independently of any export experience in period 1. The probability of becoming a permanent exporter is accordingly given by:

$$\Pr(y_{i,t} = 1) = \Pr[\lambda_1 v_{i,t-1}^0 + \lambda_2 \Delta v_{i,t-1} + \lambda_3 z_{r,t-1} + \lambda_4 k_{t-1} + \mu_i > \Pi_{i,t}^{y_i=0}] \quad (5)$$

The assumption that the error term follows a normal distribution with zero mean and constant variance permits estimation of Equation 5 as a binary probit model.

Addressing the third hypothesis, which concerns the probability of a firm expanding on foreign markets by establishing new export links or introducing new export products, it is again predicted that these decisions are influenced by firm- and location-specific variables. Of particular interest are the firm's experiences from export market participation in previous periods. Experiences from export activities are supposed to generate learning effects, which reduces entry costs and thereby increase the probability of entry on new export markets.

However, as we are only interested in successful entries in the sense that they result in a permanent export link, the choice of entering a new foreign product market also includes the

choice of permanent export market participation. From an econometric point of view there is an identification problem since these two choices are not independent, i.e. the decision to expand on foreign markets in period 2 is conditional upon the choice of being a permanent exporter in period 2. This problem arises due to the selection bias that follows from the definition of a successful entry: by definition, only permanent exporters in period 2 are selected into export market expansion in that period. Let us, for simplicity, assume that export experience is the only observable variable that influences firms export decisions. This assumption implies that the selected sample will be a sample dominated by experienced firms since firms with experiences from export markets are more likely to be permanent exporters. However, this non-random aspect of the selected sample does not cause the selection bias but the bias occurs because some inexperienced firms will also be among the permanent exporters. Due to some unobserved factor, say entrepreneurial skills, some inexperienced firms will choose to export permanently. Assuming that entrepreneurial skills have a positive effect on the probability of expanding on export markets, the effect of experience on export expansion will be underestimated, since inexperienced firms in the selected sample are unusually entrepreneurial.

One way to correct the selection bias described above is to use the two-step estimation procedure introduced by Heckman (1979). This procedure includes one selection equation and one outcome equation that are not conditioned to be independent. The outcome equation gives the probability of expanding on foreign markets as a function of the expected profit from this new export activity:

$$e_{i,t} = \begin{cases} 1 & \text{if } \Pi_{i,t}^{e_i=1}(v_{i,t-1}^0, \Delta v_{i,t-1}, z_r, k_{i,t-1}) > 0 \\ 0 & \text{otherwise} \end{cases}$$

Hence, the dependent variable takes the value 1 if the firm enters on new geographical product markets or zero otherwise and the outcome equation takes the form of a probit regression:

$$\Pr(e_{i,t} = 1) = \Pr[\gamma_1 MP_{i,t-1} + \gamma_2 MD_{i,t-1} + \gamma_3 v_{i,t}^0 + \gamma_4 z_{r,t}^0 + \eta_{li} > 0] \quad (\text{Outcome equation})$$

(6)

The explanatory variables now includes a dummy variable, MP_{t-1} , which reflects if the firm has experience from exporting multiple products in period 1 and a dummy variable, MD_{t-1} , which reflects if the firm's export activities have involved multiple export destinations in

period 1. In practice these dummy variables take the value 1 if the firm's export activities in period 1 have comprised at least 6 products and at least 6 destinations, respectively. In addition, the outcome equation also includes a vector of other firm characteristics and a vector of location-specific variables, both measured at the beginning of period 2.

As explained above the dependent variable may take the value 1 only if the firm decides to be a permanent exporter in period 2. Assuming that this selection process depends on a profit condition, we can write:

$$p_{i,t} = \begin{cases} 1 & \text{if } \Pi_{i,t}^{y_i=1}(v_{i,t}^0, z_{r,t}^0) > \Pi_{i,t}^{y_i=0}(v_{i,t}^0, z_{r,t}^0) \\ 0 & \text{otherwise} \end{cases} \quad (7)$$

Assuming normally distributed disturbances, a probit model estimates the probability that a firm chooses to be a permanent exporter in period t by:

$$\Pr(p_{i,t} = 1) = \Pr[\alpha_1 v_{i,t}^0 + \alpha_2 z_{r,t}^0 + \eta_{2i} > \Pi_{i,t}^{y_i=0}] \quad \text{(Selection equation)} \quad (8)$$

If the error terms in Equation 6 and 8 are correlated a standard probit regression of equation 6 will provide biased results implying that the two-step probit model with selection is preferable.

Explanatory Variables

Following previous empirical work in this research field, three types of variables are included in the regression analyses: firm performance variables, variables reflecting firms' export market experiences in previous periods and variables reflecting the characteristics of the region where the firm is located. In this subsection the measurement of the firm- and location-specific variables are briefly presented.

Firm characteristics

Given results from previous empirical research the firm-level variable of particular interest is the productivity level, since this is an indicator of the firm's competitiveness. As data on firm-level capital stocks are not available, this study focuses on labor productivity measured as

the value added per employee. Another variable that may influence firm's export decisions is the firm's human capital intensity. This variable can be presumed to reflect the magnitude of sales and marketing efforts in the firm as well as investments in product and process development. As a consequence one would expect firms with high human capital intensity to be more competitive in international markets and therefore more likely to participate in export markets. The human capital intensity is measured as the share of employees that have at least three years of university education. Moreover, the size of the firm is an important variable since it reflects the efficient scale of production. If the minimum efficient scale of production is very large for some product groups, firms producing those kinds of products are more likely to export simply because they have to overcome the limitation of the domestic market demand. Furthermore, the corporate ownership of the firm is included among the regressors in the form of a dummy variable for firms belonging to a Swedish-owned MNE and a dummy variable for firms belonging to a foreign-owned MNE. These variables are expected to increase the probability of export market participation, since a large fraction of total world trade flows takes place on trading links between firms within the same MNE.

All firm-level variables presented above are expected to have a positive influence on the probability of a firm being an exporter. Indeed, all these firm-specific variables are also likely to be correlated. Theoretically, however, they affect firms' competitiveness through different economic mechanisms for what reason it is of interest to include them all together.

Regional Characteristics

Previous research on firms' export behavior observes agglomeration effects, which may stimulate firms' export market participation. Some author argues that these agglomeration effects arise primarily due to incidence of external flows of knowledge and information about foreign market conditions. With the purpose of examining such spill over effects we follow Aitken et al. (1997), Barrios et al. (2003), Alvarez (2007) (among others) and include three variables reflecting the regional concentration of industry activities. These concentration measures are defined on the finest regional level; municipalities. For the given time period, there are 288 municipalities in Sweden and the municipality concentration of 1) export activities, 2) MNE enterprises and 3) overall industry activity are presumed to have positive influences on the probability of a firm being a permanent exporter.

First, we consider the possibility of external economies in exporting activities arising from the geographical agglomeration of exporters. Similar to previous studies this variable is calculated

at the industry-municipal level. However, recognizing the fact that markets are defined by groups of products rather than by industry classifications, we make use of the information about firms' export by product group available in our data. The statistical classification of product groups (HS or SITC) is strongly related to the statistical classification of industries (NACE). Still, firms that have not produced the exported goods themselves account for a substantial part of aggregate international export flows. If one only includes manufacturing firms when calculating the measures of export concentration within an industry, the available knowledge and information about foreign markets are likely to be underestimated since the market information possessed by retail trading firms are not included. Furthermore, many manufacturing firms export products that are classified to another industry than the industry in which they have the majority of their employment. Therefore the measure of industry-regional concentration of export activities used in this analysis is based on the total number of firms (manufacturers and retail traders) in a municipality that are exporting products classified according to a two-digit industry code. Following Glaeser et al. (1992) and Henderson (1995) (among others) the measure of local agglomeration of export activities is calculated as the regional share of the total number of firms that export goods produced by a specific industry normalized by the region's share of the total number of firms in that industry. As argued by Aitken et al. (1997) this measure put its emphasize on the role of localized export spillovers as it implies that there is a spatial export concentration only if this concentration exceeds the geographical concentration of the industry as a whole.

Second, a variable reflecting the geographic concentration of the overall economic activity is calculated. There are many factors that may induce agglomeration of firms and this variable is included to control for agglomeration economies that are not related to export activities. Using the same methodology as for export concentration, this variable is calculated as the region-industry share of national industry employment divided by the region's share of total manufacturing employment.

Third, the role of MNE's as disseminators of knowledge and information about foreign markets are approximated by the industry-region's share of the total number of firms belonging to a MNE relative to the region's share of the total number of firms in that industry.

4. The export behavior of Swedish Firms

The empirical testing of the hypothesis presented in the previous chapter is based on a micro

data set of Swedish firm during the period 1997 – 2004. Observations are at the firm level and the location of each firm is defined at the municipality (local government area) where the major share of the firm's employees is located. The same method is applied for the industry classification of each firm; firms are classified to the industry in which they have the major share of their employment. Besides firm characteristics, the data set includes the export activities of each firm, classified at the level of 8-digit product groups and with regard to destination country.

In order to distinguish between firms with different export behavior, the export status of each firm is initially identified over the whole period 1997 – 2004. A permanent exporter is defined as a firm that exports in each year throughout this period, an occasional exporter as a firm that exports only in some of the eight years, and a non-exporter is a firm that does not export in any year. This identification of export status implies that only firms that exists over the whole period is included in the analysis. Moreover, firms with less than 10 employees in average over the period are excluded from the analysis⁶. With this censoring, the data set used includes 3828 firms.

Descriptive statistics in Table 1 show that almost 65 % of the firms are permanent exporters, whereas 25 % are occasional exporters and only 10 % are non-exporters. 39 % of the firms exporting permanently belong to a multinational enterprise. The corresponding figure for occasional exporters is 10 % and only 6 % for non-exporters. Moreover, 29 % of those firms that are permanent exporters are incorporated in a Swedish owned MNE whereas only 10% are foreign owned. Table 1 supports previous findings that exporters are, on average, superior to non-exporters in terms of firm size, physical- and human capital intensity and labor productivity. Furthermore, the figures in Table 1 suggest that firms exporting permanently are larger, more intensive in human and physical capital and have higher labor productivity than have firms that export occasionally.

⁶ This data censoring may induce a selection bias as all firms in the selected sample performs sufficiently well in terms of sales and productivity to survive throughout the whole period. As a consequence the influence of the explanatory variables on export behavior may be underestimated.

Table 1 Characteristics of firms with different export status 1997-2004

	Permanent Exporters		Occasional Exporters		Non-exporters	
Total number of firms (1997-2004)	2476		972		380	
Percentage of firms belonging to a Swedish MNE (1997)	29		9		4	
Percentage of firms belonging to a foreign MNE (1997)	10		1		2	
	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>
Firm size (number of employees, 1997)	134.72	39.00	37.90	18.00	23.34	16.00
Percent of employees with university education (1997)	4.11	2.17	2.07	0.07	1.89	0.01
Labor productivity (value added per employee in thousands SEK, 1997)	475,53	427,8	397,15	366,02	370,33	344,3

To investigate the influence of firms' previous export experiences on the decision about current export participation, the data is divided into two sub-periods: 1997 – 2000 and 2001 – 2004. Firms' are classified according to the consistency in export behavior over each sub-period. A contingency analysis of firms' export behavior over the two periods is displayed in Table 2. This table shows that there is a high persistence in export behavior over the two periods; firms being permanent exporters in period 1 most likely remain permanent exporters in period 2, whereas a non-exporter in period 1 most likely abstain from foreign market participation also in period 2.

Still, some firms do change export status between the two periods and the contingency table suggest that it is more likely to become a permanent exporter in period 2 if the firm is exporting sporadically in period 1 than if the firm is a non-exporter in period 1. Thus, the figures in Table 2 give some support to the hypothesis that there are learning-effects from sporadic export activities, which amplify the probability that the firm becomes a permanent exporter.

Table 2 Firm export status across two periods

		Export Status 2001 – 2004			
		Permanent exporter	Occasional exporter	Non-exporter	Total
Export Status 1997 – 2000	Permanent exporter	2476	119	7	2602
	Occasional Exporter	222	314	128	664
	Non-exporter	25	157	380	562
	Total	2723	590	515	3828
χ^2 - value (significance)		2966.78 (0.000)			

Turning the interest to firms' entries on new export markets, this paper only considers successful entries in the sense that the entry results in a permanent presence of the firm on a specific geographical product market. Since markets can be defined both in geographical terms and in terms of products, export market entry can be defined in two ways: 1) entry on a new geographical market and 2) introduction of a new product. We identify these two types of entries by distinguishing those markets and products where the firm has positive export in all years in the period 2001 - 2004 and where export was zero in all years in the period 1997 - 2000. A contingency analysis of firms export market status in period 1 and export expansion in period 2 is shown in Table 3.

The figures in table 3 reveal that the majority (57 %) of those firms that were permanent exporters in the first period introduced new export products in the second period. 19 % of those firms also entered on new geographical markets in the second periods. These percentage shares are high compared to the fractions of firms that entered on new exports markets among occasional exporters or non-exporters. Only 28 % of the firms that were exporting occasionally in period 1 entered on new destinations or introduces new products in period 2. The corresponding figure for non-exporters in period 1 is as low as 4 %.

Table 3 Previous Export Status and Export market expansion

		Export market entry 2001 – 2004			
		Entry on new export destinations	Introduction of new export products	No entry	Total
Export Status 1997 – 2000	Permanent exporter	498 (19 %)	1497 (58 %)	607 (23 %)	2602
	Occasional Exporter	65 (10 %)	120 (18 %)	479 (72 %)	664
	Non-exporter	11 (2 %)	9 (2 %)	542 (96 %)	562
	Total	574	1626	1628	3828
χ^2 - value (significance)		1305.06 (0.000)			

The figures in Table 3 signify that firms' export experiences may have an influence on the probability of export market expansion. A stronger indication of knowledge accumulation from participation in foreign markets would be if there were a relationship between the scope of export experiences in one period and the probability of export market expansion in the next period. The scope of a firm's export experiences in given period can be measured as the number of product-specific geographical market that the firm exports to⁷. Using this measurement of export experience the contingency analysis in Table 4 show that the larger is the scope of export activities in period 1, the more likely it is that the firm establishes a new export link or introduces a new product on the export market in period 2. In fact only 64 of the 1144 firms with the largest export experience in period 1 abstain from expanding on export markets in period 2.

⁷ Algebraically the scope of export experiences can be expressed as $\sum_i \sum_j \delta_{ij}$ where $\delta_{ij} = 1$ if the firm export product variety i to destination j and takes a zero value otherwise.

Table 4 Export experiences and export market expansion

		Export market entry 2001 – 2004			
		Entry on new export destinations	Introduction of new export products	No entry	Total
Scope of Export Experience ^a 1997 – 2000	High	185	895	64	1144
	Medium	253	472	258	983
	Low	125	232	713	1070
	Zero	11	27	593	631
	Total	574	1626	1628	3828
χ^2 - value (significance)		1768.73 (0.000)			

^{a)} The scope of export experience is measured as the number of product specific export destinations a firm exports to. See footnote 6 in the text.

The information presented in Tables 1 – 4 gives some support for the hypotheses about firms export behavior formulated in Section 2. The next section presents the results of the estimations of the econometric models formulated in the previous Section, which are used to test these hypotheses more carefully.

4. Empirical Results

This section presents the results of the empirical analysis of the influence from firm characteristics, export experiences and locational factors on firms' export decisions.

Differences between firms with different export status

The multinomial logit regression model presented in Equation 3 explains differences in firms' export status with differences in initial firm-level characteristics and locational variables. Consequently, all variables in the model are measured at the beginning of the period. In the estimations the status non-exporter have been used as the reference outcome, implying that the estimated regression coefficients reflect the impact of each explanatory variable on the probability of being a permanent respectively a occasional exporter *relative* to being a non-exporter.

The estimated coefficients in the multinomial regression are presented in Table 5. These estimates reveal that the size of the firm and its labor productivity significantly increase the probability of export market participation both on a permanent and an occasional basis. Human

capital intensity and affiliation to a domestic MNE are variables that appear to increase the probability of a firm being a permanent exporter compared to a non-exporter but do not seem to have any significant influence on the probability of exporting occasionally. Moreover, firms affiliated to a foreign MNE seem less likely to be occasional exporters, whereas a foreign MNE ownership does not have any significant impact on the probability of having a permanent export status. This outcome suggests that firms affiliated to a foreign MNE have a persistent export behavior, be it as an exporter or non-exporter.

Among the regional variables, the industry-regional concentration of exporters has a significant positive influence on the probability of a firm being a permanent or occasional exporter. Also the regional concentration of overall industry activity shows a significant positive impact on the probability of permanent export market participation, but for sporadic export this variable is not significant. The regional concentration of MNE is, on the other hand, not significant for any outcome, which is surprising given some previous empirical findings. One possible explanation, put forward by Sjöholm (2000), is that when firm-level ownership is already controlled for, spillover effects from MNEs is likely to be of importance only for independent domestic firms⁸.

The regression results in the first two columns of Table 5 indicate that there is a difference between permanent and non-exporters and a difference between occasional and non-exporters. However, these figures do not explicitly reflect the differences between permanent and occasional exporters. Re-estimating the multinomial logit model with the occasional export status as reference outcome give the difference in coefficients between permanent and occasional exporters along with the associated standard errors. These differences in coefficients between permanent and occasional exporters (presented in the last column of Table 5) are statistically significant for all variables that have a significant impact on any outcome.

⁸ To examine this possibility, the MNE concentration variable has been interacted with a dummy variable that takes the value 1 for independent domestic firms. However, the estimated coefficients for this variable are not significant for any outcome.

Table 5 Results of multinomial logit regression including three export statuses

	Regression Coefficients (Standard error)		Difference in Coefficients (Standard error)
	<i>Permanent Export</i>	<i>Occasional Export</i>	<i>Permanent Export – Occasional Export</i>
Size (number of employees)	0.2337** (0.0034)	0.0197** (0.0034)	0.0037** (0.0008)
Human capital intensity	3.1915* (1.4570)	-1.1271 (1.5573)	4.3186** (1.0033)
Labor productivity	0.0035** (0.0005)	0.0016** (0.0005)	0.0020** (0.0003)
Domestic MNE (dummy)	1.1814** (0.2848)	0.1342 (0.2996)	1.0472** (0.1366)
Foreign MNE (dummy)	0.2587 (0.4240)	-0.1488* (0.4846)	1.4075** (0.2966)
Regional concentration of industry exporters	0.4252** (0.1288)	0.2891* (0.1304)	0.1362* (0.0596)
Regional concentration of MNEs	-0.0173 (0.0642)	0.0220 (0.0649)	-0.0392 (0.0216)
Regional concentration of industry activity	1.1844* (0.5366)	0.8363 (0.5316)	0.3481* (0.1603)
Constant	-0.2712 (0.4636)	0.1208 (0.4759)	-0.3919 (0.2240)
Pseudo R ² (McFadden)	0.21		
Number of observations	3828		

All regressions include 2-digit industry dummies. The base-level outcome is non-exporter.

** Significant at 1 % level, * Significant at the 5 % level.

The conclusion to be drawn from Table 5 is that there are significant differences in firm characteristics between permanent and occasional exporters, where the formers appear to be larger, more intensive in human capital and more productive than the latter. Moreover, it seems like agglomeration effects from geographic concentration of exporters and industry employment have a stronger impact on permanent export market participation than on occasional sales to foreign markets.

In order to facilitate the economic interpretation of the coefficients of the multinomial logit model, the marginal effect of a unit change in the explanatory variables on the probability of a given outcome are presented in Table 6. The marginal effects are calculated at the mean values of the independent variables, which are presented in the last column of Table 6. As shown by these figures the marginal effects of a unit change in the explanatory variables on the probability of each outcome (permanent or occasional export) are almost mirror images of each other. This finding suggests that the relevant choice of export strategy for most firms in the sample is that of permanent versus occasional export market participation. The Hausman test of the IIA (Independence of Irrelevant Alternatives) property is applied to examine if the

disturbances in Equation 2 are independently distributed across choice alternatives. The test shows that the error terms are not independent, which indicates that the IIA property is violated as two choice alternatives share common unobserved attributes. In this case, the violation of the IIA property signifies that occasional exporters have more attributes in common with non-exporting firms than with firms exporting permanently.

Table 6 Estimated marginal effects

	Marginal Effects calculated at the mean of explanatory variables (Standard error)		Variable mean
	<i>Permanent Export</i>	<i>Occasional Export</i>	
Size (employees)	0.00065 (0.00012)	-0.00059 (0.00012)	99.221
Human capital intensity (%)	0.00708 (0.16457)	-0.00703 (0.16418)	3.3
Labor productivity	0.00032 (0.00005)	-0.00032 (0.00005)	445.370
Domestic MNE (dummy)	0.14392 (0.01641)	-0.14201 (0.01637)	-
Foreign MNE (dummy)	0.15717 (0.02124)	-0.15699 (0.02116)	-
Regional concentration of industry exporters	0.02299 (0.00981)	-0.02200 (0.00978)	1.527
Regional concentration of MNEs	-0.00642 (0.00354)	0.00640 (0.00353)	1.334
Regional concentration of industry activity	0.05896 (0.02621)	-0.05622 (0.02612)	0.329

1. The marginal effect (dx/dy) of a change in a dummy variable is calculated for a discrete change from 0 to 1.

The violation of the IIA property implies that the multinomial logit regression applied above is inefficient for forecasting purposes. However, for hypothesis testing the IIA property is not of particular relevance (Dow et al. 2004). Consequently, the results of the multinomial logit model can be interpreted in support of the hypothesis that there are significant differences between firms exporting permanently and firms exporting occasionally.

The probability of becoming a permanent exporter

Addressing the hypothesis of learning effects from export market participation that reduce entry costs, we start by testing the hypothesis that firms that export occasionally in period 1 are more likely to become permanent exporters in period 2 than are firms with no export experience in the first period. To test this hypothesis, we only include those firms that were occasional or non-exporters in period 1 in the analysis (1226 firms) and apply the probit model specified in

equation 4 and 5. This model includes firm characteristic variables measured at the beginning of period 1 as well as variables measuring the change in those characteristics over period 1. Moreover, the location-specific variables, calculated as the mean values over period 1, are included. Finally, the model also includes a dummy variable for export status in period 1 (1 = occasional export).

Table 7 presents the results of the probit regression. Among all regressors only two variables show a significant impact on the probability of becoming a permanent exporter: the dummy for occasional export in period 1 and the dummy variable for firms affiliated to a Swedish MNE. The marginal effect (calculated for a discrete change from 0 to 1) of previous export experience implies that if the firm acquires some experience from foreign market participation in the first period the probability of becoming a permanent exporter in the following period increases by 0.28. The marginal effect of the ownership dummy implies that if a firm belongs to a Swedish MNE by the end of period 1 this increases the probability of being a permanent exporter by 0.22.

Table 7 Results of Probit regression: Probability of becoming a permanent exporter

	Regression coefficient	Standard error	Marginal effects ⁽¹⁾	Variable mean
Size ₁₉₉₇	0.0012	0.0013	0.0003	28.401
Human capital intensity ₁₉₉₇	-1.6470	1.0964	-0.3874	0.020
Labor productivity ₁₉₉₇	0.0001	0.0003	0.00001	387.40
Growth in human capital intensity ₁₉₉₇₋₂₀₀₀	-1.9578	1.5962	-0.4605	0.007
Growth in labor productivity ₁₉₉₇₋₂₀₀₀	-0.0114	0.1110	-0.0027	1.167
Domestic MNE ₂₀₀₀ (dummy)	0.7283**	0.1509	0.2201	-
Foreign MNE ₂₀₀₀ (dummy)	0.4610	0.3033	0.1322	-
Occasional export in period 1 (dummy)	1.2467**	0.1122	0.2791	-
Industry-region export concentration	0.0459	0.0765	0.0108	1.305
Regional concentration of MNEs	-0.0491	0.0395	-0.0116	0.690
Industry-region concentration of ec. activity	0.2099	0.2321	0.0494	0.231
Constant	-1.8404**	0.3225	-	-
Mc Fadden Pseudo R ²	0.20			
Number of observations	1226			

1. The marginal effects (dx/dy) are calculated at the mean of the independent variables. For dummy variables the marginal effects are calculated for a discrete change from 0 to 1. ** Significant at the 1 % level.

The results of the probit regression presented in Table 7 indicate that there are significant positive effects of previous export experiences on the probability of becoming a permanent exporter. This outcome can be interpreted as an indication of the presence of learning-effects from occasional export market participation, which increases the probability of a firm becoming a successful exporter, who is able to remain competitive in foreign markets on a

permanent basis.

Probability of expanding sales to new export markets

The final issue to be addressed in this paper is the probability of a firm expanding its export activities to include additional products and/or additional destination markets. The Heckman selection probit model presented in Equations 6 - 8 is estimated separately for two firm choices: 1) introduction of a new export product and 2) establishment of a new export link. We only consider new successful entries in the sense that they result in a permanent export status for the firm of that product or on that destination link throughout period 2. Moreover, we only consider a 'pure' entry in the sense that an entry is identified only if a firm starts to export products in a 8-digit product group in which it had no export in any year in period 1 or if the firm starts to export to a country which it did not export to in any year in period 2. The results of these estimations are presented in Table 8.

The regression results of the outcome equation presented in the top of Table 8 indicate that the human capital intensity and affiliation with multinational corporations, domestic and foreign, significantly increase the probability of a firm introducing an additional product on the export market. Moreover, the dummy variable for multi-product export experience in period 1 shows a strongly significant positive impact on the probability of introducing new products. Experience from exporting to multiple geographical markets, on the other hand, does not seem to have any significant influence on the probability of expanding the range of products sold abroad.

Looking at the probability of establishing new export links, the regression results suggest that firms with multi-market export experience in period 1 are more likely to enter new markets than are firms that only exported to few markets in period 1. On the other hand, firms that exported many products in period 1 are less likely to establish new geographical export links. According to the results presented in Table 8 such firms rather expand their export activities by introducing additional products. However, a large fraction (42 %) of multi-product firms also export to multiple destinations, implying that there are multicollinearity between these two variables. It is therefore somewhat difficult to separate the impacts of these two variables. As it appears, however, firms that already export multiple products are more likely to introduce new products on foreign markets. This is an expected outcome since large multi-product firms are

likely to be more innovative and develop new products more frequently than firm's manufacturing few products and since large multi-product firms already exports to many destination countries they are more likely to expand their export activities by adding more product varieties.

Table 8 Heckman selection estimations of probability of export market expansion

	Introduction of new products		Entry on new geographical markets	
Outcome equation (probability of export market expansion)	<i>Estimated coefficient</i>	<i>Std. Error</i>	<i>Estimated Coefficient</i>	<i>Std. Error</i>
Human capital intensity ₂₀₀₀	1.0823*	0.4309	0.9556*	0.4537
Labor productivity ₂₀₀₀	0.0001	0.0001	0.0003*	0.0001
Domestic MNE ₂₀₀₀ (dummy)	0.3628**	0.1057	0.2721**	0.0897
Foreign MNE ₂₀₀₀ (dummy)	0.2975*	0.1206	0.3304**	0.1040
Multi-market export experience in period 1 (dummy)	0.0468	0.0832	0.5568**	0.0847
Multi-product export experience in period 1 (dummy)	0.4956**	0.0802	-0.1266	0.0770
Industry-region export concentration	-0.0090	0.0360	0.0321	0.0361
Regional concentration of MNEs	-0.0010	0.0114	-0.0038	0.0112
Industry-region concentration of economic activity	0.0250	0.0757	-0.0472	0.0768
Constant	-0.4824*	0.2154	-0.1474	0.1901
Selection equation (probability of permanent export status in period 2)				
Size ₂₀₀₀	0.0009**	0.0002	0.0009**	0.0002
Human capital intensity ₂₀₀₀	0.7513*	0.4350	0.7733*	0.4149
Labor productivity ₂₀₀₀	0.0006**	0.0002	0.0007**	0.0002
Domestic MNE ₂₀₀₀ (dummy)	0.8987**	0.0737	0.8781**	0.0740
Foreign MNE ₂₀₀₀ (dummy)	1.0882**	0.1111	1.0813**	0.1105
Industry-region export concentration	0.1445**	0.0355	0.1464**	0.0356
Regional concentration of MNEs	-0.0321**	0.0122	-0.0327**	0.0121
Industry-region concentration of economic activity	0.2197*	0.0970	0.2243*	0.0977
Constant	-0.0363	0.1291	-0.0686	0.1293
Number of observations (censored observations)	3828	(1104)	3828	(1104)
Wald χ^2 (30) (prob > χ^2)	270.13	(0.000)	197.61	(0.000)
LR-test of independent equations χ^2 (1) (prob > χ^2)	4.76	(0.031)	4.98	(0.021)

Estimations include 2-digit industry dummies, not presented in the table. ** Significant at the 1 % level, * Significant at the 5 % level

As in the case of introduction of new export products, affiliation with MNEs (domestic and foreign) seem to increase the probability of geographical expansion. Comparing the influences of other firm-level variables on the two types of export market expansion points to the conclusion that human capital is of larger importance for the probability of expanding export sales by introducing new products, whereas geographical export expansion seems to be more dependent on firm-level labor productivity. This finding indicates that the competitiveness of firms that undertake product innovation is less dependent on the firm's production efficiency in terms of labor productivity. On the other hand, efficiency in the production process seems to be crucial for firms' geographical export expansion.

The variables measuring the industry-regional concentration of exporters, multinationals and overall industry economic activity do not show any significant impact on the probability of export market expansion in either respect. However, the results of the selection equation in the bottom of Table 8, confirm that regional concentration of firms exporting the industry's products stimulate permanent export market participation. The same is true for the variable reflecting the regional concentration of overall industry activity, whereas the concentration of MNEs shows a significant negative impact. Given some empirical findings in previous studies, this outcome is unexpected. A possible explanation may be that firms' affiliation with MNEs is already controlled for with firm-specific variables and manufacturing firms with an independent ownership located in regions with a strong concentration of MNE activities tend to be suppliers to those MNEs and therefore less export oriented.

The results of the selection equation confirm the results from the multinomial logit regression presented in Table 5, suggesting that firms with superior characteristics in terms of size, labor productivity, human capital intensity are most likely to be permanent exporters in period 2. The probability of being a permanent exporter also increases if the firm is affiliated with a multinational firm.

Summarizing the results from the probit regression in Table 8, they provide some evidences of learning-effects from previous export activities that stimulate exporting firms to expand their export activities both in terms of product scope and geographical diffusion. As in previous regressions there are indications of agglomeration effects that stimulate permanent export market participation, but no significant evidences of agglomeration effects affecting the probability of export market expansion among permanent exporters.

A final comment concerning the Heckman selection probit estimations concerns the LR-test of independence between the selection and the outcome equation. This is a test of correlation in the error terms of the two equation, where the null-hypothesis is that $\rho = \text{corr}(\eta_{1i}, \eta_{2i}) = 0$. As indicated by the χ^2 -values in the bottom row of Table 8, the null-hypotheses is rejected, which implies that the probit regression with sample selection is preferable to a standard probit estimation.

6. Summary and Concluding Remarks

This paper addresses the importance of information and knowledge about foreign markets for firms' export decision. Theoretical and empirical literature explains variations in firms' export behavior with the existence of export market entry costs. A substantial part of this fixed (sunk) investment originates from the necessity of having accurate knowledge about market conditions and business practices in various export destinations. This type of market knowledge is to a great extent of experiential type and is accumulated in the individual firm through the process of penetrating foreign product markets. In this paper it is argued that this knowledge is useful in the process of establishing additional export links, implying that there may be a learning-effect from penetrating foreign markets, which stimulates further export market expansion. Furthermore, knowledge and information about foreign markets can be shared or spill over between firms for what reason this study also considers the influences of external knowledge on firms export behavior.

The empirical analysis of firms' export behavior is based on discrete choice models, focusing on three types of export behavior. First, we consider the consistency in export status, distinguishing between firms that export permanently, occasionally or do not export at all over a period of 8 years. Second, the data is divided into two sub-periods such that we may observe changes in firms' export status. Of particular interest are firms which change from an occasional export status or non-export status in period 1 to a permanent export behavior in period 2. Third, we address the probability of firms expanding on export markets through introduction of new export products or establishment of new geographical export links.

The estimations include three types of variables: 1) firm-level characteristics (size, labor productivity and human capital), 2) the firm's export experiences in previous periods and 3) location-specific variables reflecting the potential for firms in a given region to benefit from knowledge and information externalities. Summarizing the results, we focus separately on the three types of explanatory variables.

Firm characteristics in terms of size, labor productivity, human capital intensity and MNE affiliation increase the probability of a firm being a permanent exporter relative to the probability of exporting occasionally or not exporting at all. However, these firm-level variables do not seem to stimulate the probability of a firm changing its export status from non-export or occasional export to permanent export market participation. Nevertheless, the labor productivity and MNE affiliation have a positive effect on the probability of a firm expanding its export activities to new geographical export destinations. For export expansion through introduction of new export products, the empirical results suggest that it is the human capital intensity rather than labor productivity that is the crucial factor. One interpretation of these findings is that the competitiveness of firms that undertake product innovation is less dependent on the firm's production efficiency, i.e., the labor productivity, whereas this efficiency, on the other hand, is of significant importance for firms' geographical expansion on export markets.

Firms' previous export experiences appear to have a strongly significant impact on current export decisions. Descriptive statistics reveal a strong persistence in export status over the two sub-periods considered in this analysis. Still, some firms do change export status and estimations of a binary probit model suggest that those firms that gather some experiential knowledge about foreign market through occasional export in one period are more likely to become permanent exporters in the following period than are firms that have no export experience in the first period.

Moreover, a firm that has experiences from foreign markets in one period has a higher probability of expanding its export activities in the next period. These significant effects of previous export experience on current export decisions suggest that there may be learning-effects from export market participation that reduces the cost of establishing new permanent export links. In specific, the empirical estimations show that firms whose previous export experiences include many products and many markets are more likely to introduce

additional products in their export sales. However, entry into new geographical markets seems to be less likely among firms that export many products to few markets, whereas export experience from many geographical markets stimulates further geographical expansion of export activities. These findings reflect the fact that most firms in our data that export many products already export to many destinations and as a consequence of this firms that already export many products expand on export markets by introducing additional products. Firms exporting few products to many destinations, on the other hand, tend to expand their export activities by penetrating additional markets.

This empirical analysis also examines the influence of external spatial flows of knowledge and information on firms' export decisions. The results show a significant positive effect of the region-industry concentration of exporters and of regional concentration of over all industry activity on the probability of a exporting both permanently and occasionally. These results suggest that there are within-industry agglomeration economies that influence the export decision of the individual firm, which may originate from knowledge and information externalities. To what extent such externalities exists across industries or operates over a larger spatial scale is an interesting topic for further research.

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