

Export behavior of firms in urban and rural regions

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Abstract

This paper analyzes how locational factors may influence firms' export behavior. A firm-level data set is used to investigate the influence of firm and location characteristics on three types of export behavior; permanent export market participation, occasional export and no export. A multinomial regression model is applied on firm-level data divided into two subsamples of firms; firms located in urban respectively rural regions. Empirical results indicate that firm-level variables, such as size, human capital intensity and labor productivity increase the probability of firms having a permanent participation in export markets rather than have occasional or no export. For rural firms, locational characteristics relating to specialization of local export activities and accessibility to other exporting firms seem to stimulate export market participation. In specific, the agglomeration of firms exporting goods from the own industry seem to stimulate export market participation in rural firms, whereas this variable appear to have no influence on the export behavior of firms in urban regions. This finding suggests that export activities in rural firms benefit from localized external economies supposedly related to knowledge spillovers between exporting firms.

Keywords: export behavior, knowledge spillover, urbanization, agglomeration economies, localized externalities, manufacturing industries

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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.

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. These empirical results suggest that there is a difference in export strategy between permanent exporters and occasional exporters. The purpose of this paper is to explore these issues further through an analysis of the export behavior of Swedish firms located in different types of regions.

The first objective of this paper is to examine if decisions about export market participation in Swedish manufacturing firms are influenced by the same factors as those determining export behavior of firms in other countries. On average, Swedish manufacturers are more export oriented than are manufacturing firms in 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, 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 and location-specific factors 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 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.

A third objective of this study is to analyze if firms' export strategies differ between different locations within the country. More precisely, this analysis target the question if the influences of firm-specific and location-specific variables, identified in previous studies, differ between firms located in an urban respectively a rural region. On one hand there are arguments based on the theory of new economic geography, implying that exporting firms can be expected to agglomerate in urban regions, to benefit from the diversity of inputs and suppliers and the superior infrastructure that generally characterize urban regions. On the other hand, localized economies and access to spatially trapped inputs may serve as argument for why firms may choose to locate in rural regions. When we the turn our focus on exporting firms it is relevant to stress these questions. "Gateways" to international markets are usually more attached to urban areas compared to rural areas (for example harbors, airports, business services, other exporting firms, etc.). Accordingly, urbanization economies may attract exporting firms to urban region. On the other hand, export oriented firms are less dependent on proximity to the domestic market and may find cost advantages in rural locations related to lower land rents, lower cost of certain inputs and a specialized local industry. Hence, rural firms may benefit from localization economies. To understand firms' export strategies it is important to investigate if export activities are dependent on access to economic conditions in urbanized areas. By comparing exporting firms in rural and urban regions, our intention is to study if the lack of urbanization economies in rural areas provides an obstacle for export market participation, or if localized economies based on other conditions can offset such problems.

The empirical analysis is based on firm level data of all exporting firms in Sweden for the years 1997 – 2004. In the analysis, we make use of data for the whole period to distinguish three types of export behavior: permanent export market participation, occasional export market participation and no export market participation. Firms are, accordingly, divided into three categories: (1) permanent exporters, (2) occasional exporters, and (3) non-exporters. The probability of firms to choose different export statuses is estimated by a multinomial logit model. The analysis uses a set of firm based explanatory variables such as firm size, labor productivity and human capital intensity but also include regional variables of industrial specialization concentration of exporting firms. Of particular interest in this study is how the effects of these firm- and location-specific variables on firms export decisions differ between firms in urban and rural areas. To explore this issue the multinomial logit model is applied on two subsets of firms.

This paper starts with a presentation of the synthesis of previous theoretical and empirical research on the determinants of firm-level export market participation in Section 2 that also

includes a brief overview of theories of agglomeration economies. Section 3 presents the econometric methodology, which is followed by some descriptive statistics on the location pattern of manufacturing firms in the Sweden in Section 4. The empirical results are presented and discussed in Section 5 and concluding remarks are summarized in Section 6.

2 Theoretical Background

This section presents the theoretical background to the two research questions addressed in this paper. The first subsection discussed theoretical explanations to differences in export market participation between firms independently of their location. The second subsection discusses how the location of firms may impact the propensity to sell on foreign markets.

2.1 Firms' Export Behavior

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 cannot overcome. Hence, *ex-ante* productivity differences between firms can partly explain why some firms export and others do not. Hence, the self-selection explanation assumes that productivity is an exogenous variable and no attention is given to the possibility of a causality running from export to productivity.

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 productivity. The issue of interest in this approach is differences in productivity growth rates between exporters and non-exporters. The learning-by-exporting 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 rates among exporting firms arise due to increased production scale and knowledge flows from foreign buyers and competitors. These effects improve the productivity performance in firms, *ex-post* export market entry.

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.

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. Nitsch (2009) present similar results in a study on import flows to Germany, which shows that the duration of product-country-specific trade links are surprisingly low. These findings are 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. Empirical results presented by Hallward-Driemeier et al. (2002) have similar implications. 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, Lopéz (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 sporadically. 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 on foreign market 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.

2.2 Agglomeration and urbanization economies in export activities

Spatial density and economies of agglomeration springs from scale efficiency from a localized industry and increasing returns to scale from such agglomeration. The original idea descends from Alfred Marshall (1920) who stressed that costs can be reduced if economic activities are located close to each other and pointed out the importance of localized industries. Marshall made a distinction between factors of productions that are internal and external to a firm. In particular, external factors can be assumed to have influence on a firm's choice of location. Ohlin (1922) presented a system for categorization of agglomeration economies. One category of agglomeration economies is *localization economies*, which are external to the individual firm and arise from the size of the local industry³. Another category of agglomeration is *urbanization economies*, which refers to spatial advantage with respect to access to markets with strong demand from the purchasing power of the population.

The core of the new economic geography (see Fujita et al., 1999), is how increasing returns to scale, transportation costs and the demand for manufacturing goods explain the spatial distribution of economic activities. Models in this field of theory suggest that clustering processes are likely to become self-reinforced, and a cluster will attract more firms through the external economies it can offer. Such economies can spring from both vertical and horizontal ties between firms. In relation to these considerations it is worth to notice that the evolution of a cluster (a regional- or local specialization) depends on its ability to reach a “critical mass” with respect to volume and also how vertical and horizontal beneficial combinations of the ties (interactions) between the firms in the cluster are strengthened. It is reasonable to expect that the links between firms are more important in clusters that have a high share of small firms. This type of clusters largely dominates the economy in rural areas.

A special feature of local- and regional markets and clusters is their ability to offer knowledge spillovers between firms. The access to knowledge sources and the ability to absorb spillovers from these sources constitutes an important condition for entrepreneurial activities, which generally evolve through endogenous processes. Knowledge spillovers are most often found to be spatially bounded in the sense that these effects are trapped to the specific locations. This appears to be a geographical restriction that strengthens the need of a spatial perspective when analyzing firms export behavior.

Several scholars have pointed out that a substantial fraction of the cost of participate in foreign markets 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 those markets. Geographical markets are not perfectly integrated but differ in consumer preferences, statutory product standards, price levels, import tariffs, transport and communication infra-structure etc. For each product group some market characteristics are likely to be global whereas some characteristics are very local. Moreover, firms in most manufacturing sectors produce products that to some degree are differentiated from varieties produced by other firms in the industry. Consequently, the relevant market facing each product/firm has some characteristics that are of unique relevance for each product variety and each individual firm but some characteristics that are relevant for an aggregate group of products. These features of product markets imply that knowledge being internal as well as external to the individual firm may influence firms export decisions.

In the context of export market participation knowledge and information externalities 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 possesses 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 hypothesis to be tested in this paper is that knowledge spillovers from other exporters stimulate export market participation and export market expansion.

Most studies on export and localized knowledge externalities hypothesize that these externalities depend on intra-industry agglomeration economies, thus considering the spatial concentration of economic and export activity at the industry level. A complementary view on locational effects, based on the arguments from the literature in economic geography, is that information and knowledge spillovers are enhanced by the proximity to ‘economic mass’ (Rice, et al. 2006; Fujita et al. 2002; Krugman, 1991). This idea implies that external knowledge flows, though dependent on geographical proximity, need not to be localized within a given geographical area. Furthermore, knowledge spillovers may operate across as well as within industries (Jacobs, 1969).

One important restriction for rural areas is the distance to urban regions and lack of agglomeration economies (Cheshire and Malecki, 2004). This situation appears to be of significance for rural areas in Sweden. In contrast, there are findings of relatively strong rural growth in population and GDP in central Europe, in the UK and in large parts of the US. One example is the strong growth rate in the south of the US, with a high share of people living in rural areas. Another example is the strong demand for housing in rural regions in central Europe, in particular within “shadow areas” surrounding metropolitan regions. Empirical research also stipulates that entrepreneurial activities within agricultural and rural firms can benefit from clustering of specialized knowledge and industries giving substantial demand for entrepreneurship in certain rural areas (e.g., Gibbs et al. 2005; Heilig 2002; McGranahan 1999).

At the purpose of extending the analysis of the influence of knowledge externalities on firms’ export behavior beyond the assumptions that such externalities are present only within industries and operate at a predetermined spatial scale, the empirical work presented in this paper uses an accessibility approach to detect knowledge spillovers between exporting firms. The accessibility measure is calculated over a spatial scale that includes both the local, regional and inter-regional level, thereby absorbing both local, intra- and inter-regional spatial dependencies.

3 Methodology

This section presents the methodology applied in this empirical analysis, including a description of the econometric model, the variables included in this model and the data set that the analysis is based on.

3.1 Econometric model

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 contains 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 export 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 $k = \{1,2,3\}$, then, *ex-post* we may assume that a profit maximizing firm has chosen a sequence of participation j 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 model we may test the hypotheses that initial firm characteristics and location-specific factors can explain firms' export behavior.

3.2 Explanatory Variables

For the purpose of examining the influences of both firm-specific and location-specific variables on the probability of permanent and occasional export market participation, the regression model includes variables on firm characteristics along with variables reflecting the relevant characteristics of the region where the firm is located.

Starting with firm characteristics, previous research emphasizes the role of firm productivity as a predictor of firm export behavior since the productivity level 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. 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. In sectors where the minimum efficient scale of production is very large firms are more likely to export in order 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 that are affiliated to a multinational

enterprise (MNE). This variable is expected to have a positive influence on 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 multinational corporation.

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 somewhat correlated. Theoretically, however, they affect firms' competitiveness through different economic mechanisms for what reason it is of interest to include them all together.

Turning the interest to location-specific variables, previous empirical research on firms' export behavior has observed agglomeration effects that 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. In accordance with previous studies of such spillover effects (Aitken et al.,1997; Barrios et al. 2003 among others) this analysis includes variables reflecting the regional concentration of production and exporting activities in the relevant sector. The location of the individual firm is defined at the level of municipalities (local government areas), which results in 288 possible localities of a firm in Sweden. The concentration measures are, accordingly, , calculated at the finest geographical level, i.e. municipalities.

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-regional 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, a substantial part of aggregate food export is accounted for by firms that have not processed the goods themselves. If one only includes food processing firms when calculating the measures of export concentration within the food 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 regional concentration of sectoral export activities used in this analysis is based on the total number of firms (manufacturers and retail traders) that are exporting products classified to the given industry. Following Glaeser et al. (1992) and Henderson (1995) (among others) the measure of local agglomeration of export activities is calculated as the municipality's share of the total number of firms that export goods produced by a specific industry normalized by the municipality'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 regional concentration of the overall economic activity in the industry is calculated. As discussed in Section 2.2 there are many factors that may induce agglomeration of firms and this variable is included to control for agglomeration economies that are not specifically related to export activities. This variable is calculated as a conventional location quotient, that is the municipality's share of national employment in the food sector divided by the municipality's share of total manufacturing employment.

Accordingly, this variable reflects the regional concentration of the food industry relative to the concentration of the total manufacturing sector to the region.

The concentration measures discussed above are presumed to reflect the potential for externalities arising from regional specialization and agglomeration of firms that manufactures and/or export good from the own industry. Still, knowledge and information about business opportunities and practices in foreign markets may originate from actors in other sectors and in other regions. Therefore we also include a measure that reflects the accessibility of manufacturing firms in each location to exporters in all other sectors located in any region in Sweden. The purpose of including this variable is to examine the role of proximity to exporters in all kinds of activities and in all locations, thus relaxing the assumption that externalities only operates within industries on a predetermined spatial scale.

The accessibility to other exporters is measured by the spatial proximity to the mass of export activities in a given location. This ‘mass’ is measured by the number of exporting firms in all sectors in that location, N_r , and the spatial proximity to these firms is measured through a distance decay function that relates the accessibility value to the cost of reaching the exporting firms. The accessibility to export activities of a specific location is then defined as the sum of the accessibility to exporters in the same location and the accessibility to exporters in all other locations in Sweden⁴.

3.3 Data

This empirical analysis is based on a micro data set of Swedish food processing firms 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 majority of firm employment is located. The same method is applied for the industry classification of each firm; the firm is classified to the food industry (NACE 15) if the majority of its employees are occupied in food processing. Beside basic firm characteristics the data set includes the export activities of each firm at 8-digit product groups.

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, a sporadic 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 analysis⁵. Moreover, only firms with positive sales and a positive number of employees in each year are included in the analysis.

To the purpose of analyzing differences in export behavior between urban and rural firms the firm-level data set described above is divided into two subsets. The multinomial regression model in Equation 3 is subsequently applied on one set of firms, which are located in urban areas and one set of firms located in rural areas. The definition of these two types of areas is thoroughly described in the next section.

4 Characteristics of firms in rural and urban regions

This empirical analysis employs a definition of rural and urban areas that has been used in other studies of the Swedish economy (SOU 2006:1, Johansson & Klaesson 2008). All municipalities in Sweden are classified into four different groups: (1) metropolitan areas, (2)

urban areas, (3) rural areas/countryside, and (4) sparsely populated rural areas. This definition of regions is used by the Swedish Board of Agriculture in various analyses. The four types of areas are defined in the following way:

- **Metropolitan areas:** Includes municipalities where 100 percent of the population lives within cities or within a 30 km distance from the cities. Using this definition, there are three metropolitan areas in Sweden: Stockholm, Göteborg and Malmö.
- **Urban areas:** Municipalities with a population of at least 30 000 inhabitants and where the largest city has a population of 25 000 people or more. Smaller municipalities that are neighbours to these urban municipalities will be included in a local urban area if more than 50 percent of the labour force in the smaller municipality commutes to a neighbour municipality. In this way, a functional region perspective is adopted.
- **Rural areas/countryside:** Municipalities that are not included in the metropolitan areas and urban areas are classified as rural areas/countryside, given they have a population density of at least 5 people per square kilometer.
- **Sparsely populated rural areas:** Municipalities that are not included in the three categories above and have less than 5 people per square kilometer.

The categorization of Swedish municipalities into four groups of regions is displayed in Appendix 1. As the map in Figure A1 shows the majority of Sweden’s surface is countryside and the northern regions are generally sparsely populated. In this analysis metropolitan areas and urban areas are merged into one category labeled “urban” and the other two categories are merged into one group that represents “rural”. Hence, this analysis considers only two types of regions, urban and rural. As displayed in Table 1 around 65 percent of the population lives in urban areas, while the remaining 35 percent lives in rural areas.

Table 1 Population in rural and urban areas in Sweden 2007

	Population	Percent share
Urban	5 976 389	65%
Rural	3 206 538	35%
Total	9 182 927	100%

There are a number of differences between urban and rural areas in Sweden with respect to characteristics of local and regional economies. Manufacturing production in urban areas generally takes place in larger plants, uses more educated labor, and has better accessibility to producer services and cross-border transportation structures (harbors, airports etc.) compared to rural areas. Still, rural areas host a relatively high share of Sweden’s manufacturing sector, number of firms in the food industry, around 55 percent of all manufacturing firms. However, these firms are generally smaller in size than are firms located in urban regions. Moreover, the value added per employee is slightly lower in rural firms, which has also a significantly lower share of employees with university education (see Table 2).

Although there are some important differences between rural and urban firms in the manufacturing industry, notably with respect to size and educational level of employees, we do not find the corresponding differences with respect to export behavior. As displayed in Table 2 around 60 – 70 percent of all manufacturing firms are permanent exporters, and only

around 10 percent are non-exporters. The difference we can find with respect to export behavior is that there is a somewhat higher share of permanent exporters in rural areas compared to urban areas.

Table 2 Characteristics of firms in the food industry in different type of locations

	Urban areas	Rural areas
Mean number of employees	115	86
Mean value added per employee	460	433
Mean share of employees with university education (%)	5	2
Share of firms affiliated to a MNE	30	28
Total number of firms	1737	2091
Permanent exporters, % of all firms	62	67
Occasional exporters, % of all firms	27	24
Non-exporters, % of all firms	11	9

Table 3 presents some characteristics of firms with different export status in different types of locations. In both urban and rural areas, permanent exporters are in general larger, more productive and have a higher share of employees with university education than occasional or non-exporters. Still, occasional exporters are, in average, also larger, more productive and more intensive in human capital than are non-exporters. Moreover, firms that are affiliated to a MNE participate to a larger extent in export markets. These differences between firms with different export status appear to be independent of the type of location. Nevertheless, permanent exporters in urban areas are substantially larger, more productive and more skill intensive than are permanent exporters in rural areas. The average non-exporting firm appears to have very similar characteristics irrespective of the location, except for the share of university educated persons in the firms, which are about twice as large in an urban non-exporting firm compared to a non-exporting firm located in a rural region.

Table 3 Characteristics of firms with different export status in different locations

	Firms in urban areas			Firms in rural areas		
	Permanent Exporter	Occasional Exporter	Non-exporter	Permanent Exporter	Occasional Exporter	Non-exporter
Mean number of employees	167	35	24	110	41	23
Mean value added per employee	502	405	368	455	390	373
Mean share of employees with university education (%)	6	3	2	3	1	1
Number of firms affiliated to a MNE	447	48	18	516	54	6
Total number of firms	1069	465	203	1407	507	177

Given the superior characteristics of urban firms in terms of size labor productivity and educational level of employees one would expect that these firms have a higher propensity to participate in export markets. Instead, Table 2 and 3 indicate that firms in urban regions are somewhat less export oriented than firms in rural regions. In the next section we analyze to what extent these factors impact export behavior differently in firms in different type of locations.

5 Empirical Results

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 base outcome, implying that the estimated regression coefficients reflect the influence of each explanatory variable on the probability of being a permanent respectively a sporadic exporter *relative* to being a non-exporter.

The estimated coefficients from the multinomial regression are presented in Table 5. The first three columns refer to the subset of firms located in urban areas and the last three columns refer to the subset of firms located in rural areas. Besides the estimated regression coefficients the table also displays the estimated differences in coefficients between permanent and occasional export market participation and associated standard errors.

Starting with firm-specific variables, the regression results in Table 5 reveal that the size of the firm significantly increases the probability of export market participation both on a permanent and an occasional basis. The positive influence of firm size on the probability of exporting is present in both urban and rural firms and in both types of firms, size matters more for permanent export market participation than for occasional export. However, the difference in coefficients is significant only for urban firms.

Moreover, the regression results also indicate that labor productivity stimulate permanent as well as occasional export market participation in urban firms, whereas this variable only impact on the probability of permanent export in rural firms. Human capital appears, on the other hand, to be of significant importance for export market participation only in rural firms. The insignificant effect on this variable on export behavior of urban firms may be due to the overall higher level of human capital in urban manufacturing firms. Still, in both urban and rural firms human capital significantly increases the probability of permanent export relative to occasional export. Furthermore, the export behavior of manufacturing firms in rural locations is strongly influenced by the firm's affiliation to a MNE. Firms that are affiliated to a MNE have a significantly larger probability of permanent export market participation. The estimated coefficients signify a weaker influence of a multinational corporate structure on the export behavior in urban firms, but also in urban locations affiliation to MNE significantly increases the probability of a permanent export status.

Table 4 Results of multinomial logit regression including three export statuses

	Firms located in urban areas			Firms located in rural areas		
	Regression Coefficients		Difference in coefficients between permanent and occasional exporters	Regression Coefficients		Difference in coefficients between permanent and occasional exporters
	<i>Permanent Exporters</i>	<i>Occasional Exporters</i>		<i>Permanent Exporters</i>	<i>Occasional Exporters</i>	
Size (number of employees)	0.021** (0.007)	0.0163** (0.007)	0.005** (0.001)	0.025** (0.007)	0.022** (0.007)	0.002 (0.006)
Labor productivity (Value added per employee)	0.004** (0.001)	0.002* (0.001)	0.002** (0.0005)	0.003** (0.001)	0.001 (0.0009)	0.002** (0.001)
Human capital intensity	0.030 (0.020)	-0.010 (0.022)	0.040** (0.015)	0.061** (0.027)	-0.011 (0.034)	0.072** (0.026)
MNE (dummy)	0.609* (0.312)	-0.404 (0.336)	1.012** (0.182)	1.590* (0.430)	0.461 (0.524)	1.130** (0.401)
Regional concentration of exporters	0.169 (0.150)	-0.052 (0.151)	0.221 (0.126)	0.708** (0.185)	0.587** (0.186)	0.121* (0.062)
Regional concentration of industry employment	0.969 (1.137)	1.421 (1.128)	-0.451 (0.428)	0.447 (0.556)	0.236 (0.568)	0.212 (0.174)
Accessibility to other exporters	-0.0001 (0.0001)	-0.0002 (0.0007)	-0.0001 (0.00004)	0.002* (0.0005)	0.001 (0.0006)	0.001* (0.0003)
Intercept	-0.240 (0.637)	0.191 (0.667)	-0.431 (0.389)	-0.594 (0.743)	0.024 (0.757)	-0.618 (0.381)
Pseudo R ² (McFadden)	0.220			0.209		
Number of observations	1737			2091		

Robust standard errors in parentheses ** Significant at the 1 % level, * Significant at 5 % level. 2-digit industry dummy variables are included in all estimations for the purpose of controlling for industry heterogeneity. The base-level outcome is non-exporter.

Focusing on the location-specific variables, the regional concentration of firms exporting goods from the own industry significantly affects the probability of export market participation on permanent as well as occasional basis in rural firms. This result indicates presence of some localization economies that stimulate participation in international markets among rural firms. In urban firms, the regional export concentration seems to be of less importance as the estimated coefficient is not significant for any export status.

The regional concentration of industry employment does not show to have any significant effect on firms export behavior in either type of region. Apparently, agglomeration of overall industry activity (e.g. employment) does not stimulate export market performance beyond the potential impact that this variable may have on the firm-level labor productivity. It is likely that agglomeration effects from such spatial concentration are captured by the firm-level labor productivity variable, implying that there may be some multi-collinearity between this variable and the regional concentration of industry employment⁶.

The final variable included among the location-specific regressors is the accessibility of manufacturing firms in each location to exporters in other industries in all other municipalities in Sweden. This variable appears to have a positive influence on the probability of permanent export in rural firms whereas this accessibility has no effect on export behavior in urban firms. This result suggests that export activities in firms located in urban areas, where economic and export activities are already dense and highly diversified, do not benefit from accessibility to exporters in other regions. In contrast, firms located in rural areas, where

economic activities are less dense and diversified, accessibility to exporters in other regions and sectors stimulate export market participation. Hence, accessibility to firms in nearby regions may compensate for the lack of urbanization economies in the own location.

Since it is difficult to give the regression coefficients from the multinomial logit model a clear economic interpretation, the marginal effect of a unit change in the explanatory variables on the probability of a given outcome are presented in Table 6 below. The marginal effects are calculated at the mean values of the independent variables, which are presented in columns 3 and 6 in Table 6. In accordance with results found in previous studies and the estimated regression coefficients presented in Table 5, the marginal effects signify that the probability of a permanent export status in firms in both types of location is stimulated by firm size, labor productivity, human capital intensity and affiliation with an MNE. In addition the results in Tables 5 and 6 show that export market participation of rural firms to a larger extent depends on location-specific variables compared to the export behavior of urban firms. In rural firms, export decisions seem to be significantly influenced by agglomeration economies related to export activities in the own sector and region. Moreover, export activities in rural firms seem to benefit from accessibility to exporters outside the own sector and region, which suggest that spillover effects may reach beyond the own industry and the own region.

Table 6 Marginal effects calculated at the mean of explanatory variables

	Firms located in urban areas			Firms located in rural areas		
	<i>Permanent Export</i>	<i>Occasional Export</i>	<i>Variable mean</i>	<i>Permanent Export</i>	<i>Occasional Export</i>	<i>Variable mean</i>
Size (number of employees)	0.0007**	-0.0007**	114.92	0.0004	-0.0004	85.93
Labor productivity	0.0003**	-0.0003	460.23	0.0004**	-0.0004**	432.69
Human capital intensity	0.0055**	-0.0056	4.75	0.0120*	-0.0119*	2.2
MNE (dummy)	0.1221**	-0.1219	-	0.1625*	-0.1614*	-
Regional conc. of exporters	0.0301	-0.0305	1.21	0.0207*	0.0200	1.79
Regional conc. of industry emp.	-0.0619	0.0621	0.20	0.0355	-0.0351	0.44
Accessibility to other exporters	-0.0001	0.0001	1325.5	0.0001*	-0.0001*	244.69

1. The marginal effect (dx/dy) of a change in a dummy variable is calculated for a discrete change from 0 to 1. ** Significant at the 1 % level, * Significant at 5 % level.

As shown by the figures in Table 6 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 participation⁷. 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.

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.

6 Conclusions

The conclusions to be drawn from this empirical analysis of export behavior of firms in urban and rural regions is that, in spite of significant differences in firm characteristics, export behavior do not differ very much between firms in different locations. The results from multinomial regression estimations indicate that 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. Hence, this analysis confirm previous empirical findings of 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 latters. Moreover, the regression results indicate that there are relatively small differences in how firm-level variables influence the export status of firms in different types of locations.

Empirical results from this study also indicate that agglomeration effects from a specialized regional export sector and accessibility to exporters in other sectors stimulate export market participation in rural firms, whereas export decisions in urban firms do not seem to be affected by agglomeration economies. One explanation to this finding is that firms located in urban regions already benefit from the type of urbanization economies present in these areas, e.g. diversity in supply of inputs and services and existence of cross-border transportation systems. With these types of urban attributes characterizing the own location, the concentration of exporters or industry employment do not seem to influence the export decisions in urban firms. Nor does accessibility to exporters in other regions and sectors seem to be of any significant importance for stimulating urban firms' export market participation. In contrast, these types of localization economies appear to be important for the export performance in rural firms. This finding indicates that export activities in rural firms to a larger extent depend on cooperation and sharing of knowledge and information. This insight is important for the design of export promoting policies. Still, the networks in which knowledge and information about foreign markets are diffused needs to be further explored in order to design efficient policies for export promotion. We believe that this is an interesting and important issue for further research.

Notes:

1. See Greenaway and Kneller (2007) and Wagner (2007) for an overview of theoretical and empirical literature in this field.
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 rate and 18 – 60 % in firm-level export intensity.
3. Hoover (1937) uses a similar categorization when analyzing agglomeration economies in industrial districts.
4. See for example Johansson and Karlsson (2007) or Gråsjö (2006) for a formal definition of accessibility.
5. 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.
6. This possibility has been examined by dropping the firm-specific variable reflecting labor productivity. The estimates from those regressions still show insignificant effects from regional concentration of industry employment and the effect is still negative for urban firms and still positive for firms in rural regions
7. As indicated in Table 2, only around 10 percent of the firms in the sample is do not export at all.

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Appendix

Figure 1: Swedish municipalities classified into (1) metropolitan areas, (2) urban areas, (3) rural areas/countryside, and (4) sparse populated rural areas

