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ENTRY COSTS AND ADJUSTMENTS ON THE EXTENSIVE MARGIN

- an analysis of how familiarity breeds exports

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Abstract

Fixed entry costs play an important role to explain the heterogeneity among exporters in terms of the geographical scope of their export activities. Yet, the existing literature has paid little attention to the nature and variation of such costs across different markets. This paper proposes a link between familiarity and fixed entry costs, such that (all else equal) the cost of entering a familiar market is lower than entering an unfamiliar one. A testable implication of this is that familiarity should primarily affect the extensive margin (number of exporters) of exports. This hypothesis is tested by estimating a gravity equation on a panel that describes Swedish firms' exports to 150 destination countries over a period of seven years. The results are consistent with the hypothesis and show that the effect of familiarity on the volume of aggregate exports is due to adjustments on the extensive margin. Adjustments on the extensive margin are large and have a significant impact on aggregate export volumes. The findings do not only help to clarify the nature and variation of fixed entry costs across destination markets: they also suggest a precise mechanism through which familiarity affects trade.

JEL classification: F10, F14, R12

Keywords: international trade, fixed entry costs, transaction costs, gravity, extensive margin, intensive margin, heterogeneity

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1. INTRODUCTION

Firm-level datasets from different countries reveal strong heterogeneity across firms as regards their export activities. Most firms do not export and those that do typically only export to a limited set of destination countries[1]. Recent theoretical models – Melitz (2003), Helpman et al. (2004), Helpman et al. (2005), Chaney (2006) and Eaton et al. (2005) – have shown that market-specific fixed entry costs combined with differences in the underlying characteristics of firms can explain not only why not all firms export, but also the observed heterogeneity among exporting firms in terms of the extent of their market penetration. Fixed entry costs imply that every market is associated with a productivity threshold, such that for each market firms self-select into exporters versus non-exporters. A merit of these models is that they provide a theoretical foundation for why export flows partly adjust on the 'extensive margin' (number of exporters).

Despite the significance ascribed to fixed entry costs[2] the existing literature has paid little attention to explanations of the nature and variation of such costs across different markets, both in empirical and theoretical studies. However, the observed disparities in the extensive margin between countries' unilateral export flows suggest that firms do incur fixed entry costs market by market. An understanding of how and why the magnitude of such entry costs varies across destinations, therefore, is necessary to explain variations in the extensive margin and thus variations in market-specific export flows.

By adhering to basic transaction-costs theory this paper proposes that the magnitude of fixed entry costs are related to familiarity, such that they are lower if (potential) exporters are familiar with the destination market. The main motivation for this is twofold. Firstly, the costs associated with contractual agreements are typically sunk, i.e. a significant part of them are incurred before the actual trade takes place (fixed) and are irreversible[3]. Secondly, contractual incompleteness is the norm rather than the exception and familiarity – encompassing informal and formal institutions such as culture, judicial systems and business ethics – can compensate for incomplete contracts (Hart & Holmström 1987).

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[1]Stylized facts are reported in *inter alia* Clerides et al. (1998), Bernard & Jensen (1995, 1999), Bernard et al. (2003). See in particular Eaton et al. (2004) and Andersson (2006) for data on the heterogeneity among exporters in terms of the extent of market penetration.

[2] Without fixed entry costs, productivity threshold cannot be defined. However, Eaton et al. (2005) remark that fixed entry costs is not enough to explain the patterns described by data. Both transport costs and fixed entry costs are needed (ibid. p 3).

[3] Sunk costs are fixed costs, but fixed costs are not necessarily sunk. Both sunk and avoidable fixed costs lead to productivity thresholds, but fixed avoidable costs are relevant for shutdown and exit decisions whereas sunk costs are not (c.f. Baumol & Willig 1981). Sunk costs associated with entry cannot be recovered on exit.

The role of familiarity in trade has a long tradition. Gravity estimations typically confirm that familiarity augments trade (see e.g. Huang 2007, Anderson 2000, Loungani et al. 2002, Johansson & Westin 1994ab, Hacker & Einarsson 2003). As familiarity has an evident geographical component, familiarity has also been advanced as a potential explanation for the 'mystery of the missing trade' (Trefler 1995). Anderson (2000), for instance, maintains that there must be 'extra transaction costs on top of transport costs', since actual trade barriers and transport costs are too low to account for the difference between the size of observed trade flows and the predictions from standard models. The estimated effects of distance in gravity models are typically too large given the size of actual transport costs (Grossman 1998, Hummels 2001). Yet, notwithstanding the well-documented effect of familiarity on trade, hitherto the mechanism by which familiarity enhances exports has to a large extent remained unresolved.

A relationship between familiarity and fixed entry costs does not only help to clarify the nature and variation of fixed entry costs; it also suggests a precise mechanism through which familiarity affects trade. If higher familiarity translates into to lower fixed entry costs, the trade-augmenting effect of familiarity on aggregate trade flows should primarily represent adjustments on the extensive margin (number of exporters). Fixed entry costs enter in the decision of whether to export or not to a given market, but not in the decision of how much to export since they are already paid.

The current paper tests this hypothesis on a panel dataset over seven years (1997-2003) of Swedish firms' exports to 150 destination countries. The empirical strategy is as follows: Firstly, aggregate export flows (i.e. the sum of all exporting firms' exports) from Sweden to each destination country are estimated using a one-sided gravity model, including dummy variables for familiarity. These estimates are used as benchmarks. Secondly, aggregate trade flows to each destination country and year are decomposed into (i) an extensive margin (number of firms) and (ii) an intensive margin (exports per firm). Then both components are estimated using the same model. This allows for an assessment of how each margin adjusts to the right-hand-side (RHS) variables in the empirical model. Variables that only have significant effect on the extensive margin should pertain to the magnitude of fixed entry costs. The paper also tests whether there are differences in the results between differentiated products and products with reference prices, using the product classification developed by Rauch (1999). The contribution of the paper is not to show that familiarity affects trade. Rather, the novelty is that it (i) links fixed entry costs to familiarity and (ii) conducts an

empirical test by analyzing how the extensive margin and intensive margin each adjusts to RHS variables in a gravity equation.

The remainder of the paper is organized in the following fashion: Section 2 presents the theoretical framework. It starts by illustrating how fixed entry costs associated with each market translate into market-specific productivity thresholds by using the basic structure of a model employed by Helpman et al. (2005) and Chaney (2006). This section provides a theoretical motivation for the empirical strategy in the paper. It then discusses the nature of fixed entry costs and outlines how such costs are related to familiarity by adhering to basic transaction-costs theory. Section 3 presents the data. The empirical methodology is motivated and discussed in Section 4. The results of the empirical analysis are presented in the same section. Conclusions of the paper are presented in Section 5.

2. FAMILIARITY AND ADJUSTMENTS ON THE EXTENSIVE MARGIN

2.1. Entry costs, productivity thresholds and the extensive and intensive margin of unilateral export flows

The magnitude of a country's export flows to a specific market depends on the size of two basic components: (i) number of exporting firms and (ii) exports per firm. The first component is referred to as the extensive margin and the second to the intensive margin. Variations in unilateral export flows can therefore be ascribed to adjustments on each respective margin.

Recent contributions – Eaton et al. (2005), Helpman et al. (2004), Helpman et al. (2005) and Chaney (2006) – have made progress in explaining why and how trade flows adjust on each of the margins. In these models, the rationale for an extensive margin that vary across markets stems from a combination of market-specific fixed entry costs and firm heterogeneity as regards productivity. The combination of fixed (sunk) entry costs – which imply that each foreign market is associated with a productivity threshold – and a non-uniform distribution of productivities across firms explains why the number of exporters (the extensive margin) differs from market to market. While both the extensive and the intensive margin vary with variable export costs and market size, fixed entry costs only affect the extensive margin.

To illustrate the basic relationships and provide a motivation for the subsequent empirical strategy, Table 1 presents the essential structure of the monopolistic competition model used by Helpman *et al* (2005) and Chaney (2006).

Table 1. *Basic structure of the models in Helpman et al (2005) and Chaney (2006.*

Description	Expression	Explanation of variables
Utility of consumers in market *r*	$U_r = \left(\sum_{i \in N_r} z_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \ \sigma > 1$	z_i = consumption of product *i*, produced by firm *i* (each firm produces a distinct product) N_r = number of products in market *r* (domestic + imported)
Transportation costs (iceberg) between *r* and *s*	$t_{rs} > 1 \qquad t_{rr} = 1$	-
Fixed (sunk) entry costs from *r* to *s*	$F_{rs} > 0 \qquad F_{rr} = 0$	-
Cost of exporting to market *s* for firm *i* conditional on a location in *r*, $c_{i,s}$	$c_{i,s} = \frac{\beta}{\gamma_i} t_{rs} z_{i,s} + F_{rs}$	β = parameter (same across all firms) γ_i = firm *i*'s productivity (firm-specific) F_{rs} = fixed entry cost from *r* to *s* $z_{i,s}$ = firm *i*'s exports (in volume) to *s*

The structure of the model yields an extensive and an intensive margin of unilateral export flows. Each margin in partial equilibrium is given below. A firm will export to a market as long as it can at least break even on its export flows to that market. For a firm *i* located in market *r*, the profits generated by exporting to market *s* are:

$$\pi_{i,s} = \tilde{p}_{i,s} z_{i,s} - \frac{\beta}{\gamma_i} t_{rs} z_{i,s} - F_{rs} \tag{1}$$

where $\tilde{p}_{i,s}$ denotes firm *i*'s price (c.i.f) in destination *s* and β/γ_i denotes firm *i*'s marginal cost. The marginal cost depends on the firm's productivity, γ_i, such that firms with higher productivity have lower marginal cost[4]. Because $F_{rr} = 0 \ \forall r$, it follows from (1) that all firms will supply their respective domestic market. By setting $\pi_{i,s}$ = 0, utilizing the demand function and the pricing rule that follows from the assumptions in the table and solving for productivity, γ_i, the productivity threshold as regards exports to market *s* from market *r*, $\hat{\gamma}_{rs}$, is expressed as a function of characteristics in the destination market *s* (Y_s, P_s) and factors that pertain to the link between *s* and *r* (t_{rs}, F_{rs}):

$$\hat{\gamma}_{rs} = \alpha \left(\frac{F_{rs}}{Y_s} \right)^{\frac{1}{\sigma-1}} \left(\frac{t_{rs}}{P_s} \right) \tag{2}$$

where α is a selection of constant parameters. The expression in (2) holds for all $s \neq r$ and represents the productivity level necessary for the gross profits to recover the fixed entry cost.

[4]In Helpman, Melitz & Yeaple (2004), Chaney (2006) and Melitz (2003), among others, a firm's productivity is drawn from a random distribution. A specification of the distribution of productivities across firms is not necessary for the current presentation.

The productivity threshold increases in F_{rs} but decreases in Y_s. Thus, all else equal, larger markets have lower productivity thresholds, because sales are larger in larger markets. Moreover, the threshold to distant markets is larger than to proximate markets because of transport costs and markets with higher price indexes naturally have lower productivity thresholds. Since transport costs and fixed entry costs are link-specific, the productivity threshold associated with exports to a destination market depends on the link between the origin and destination. If $F_{ks} > F_{rs}$ and (or) $t_{ks} > t_{rs}$ the productivity requirement on a firm located in market *k* as regards initiating exports to *s* is higher compared to a firm located in *r*.

All firms in *r* whose productivity exceeds $\hat{\gamma}_{rs}$ will export to *s*. The selection of exporters versus non-exporters associated with each geographic market thus depends on the *ex ante* productivity distribution across firms. Hence, exports to market *s* of a firm *i*, $z_{i,s}$, located in *r* satisfy:

(3a) $z_{i,s} > 0 \;\; iff \;\; \gamma_i \geq \hat{\gamma}_{rs}$

(3b) $z_{i,s} = 0 \;\; iff \;\; \gamma_i < \hat{\gamma}_{rs}$

Given a location in *r* the productivity thresholds associated with foreign markets 1, 2, 3, … *m* can be ordered in size such that $\hat{\gamma}_{r1} < \hat{\gamma}_{r2} < \hat{\gamma}_{r3} \; \ldots < \hat{\gamma}_{rm}$. A firm with low productivity will then serve a limited number of markets of low order, i.e. low productivity thresholds, whereas firms with higher productivity can export to a larger number of markets. This illustrates that the extensive-margin vary across markets with different productivity thresholds. The intensive margin (export per firm) from *r* to *s* is given by:

(4) $$z_{i,s}\left(\gamma_i \middle| \gamma_i \geq \hat{\gamma}_{is}\right) = \theta\left(\frac{\gamma_i}{t_{rs}}\right)^{\sigma} P_s^{\sigma-1} Y_s$$

where θ is a selection of constant parameters. Given a productivity threshold, whether a firm in *r* exports to market *s* is conditional on that its own productivity meets the productivity threshold associated with *s*.

As is evident from (2) and (4), both the extensive and the intensive margin vary with distance, market-size and the price index. However, the fixed entry cost, F_{rs}, enters in (2) but is absent from (4). Thus, fixed entry costs affect the decision *ex ante* whether to enter a market

or not, but do not have an impact on price and output decisions *ex post*. After entry, F_{rs} represents sunk costs such that its level does not affect the intensive margin (output per firm)[5]. This forms the basis for the subsequent empirical strategy: variables that pertain to fixed entry costs should by definition only have a significant effect on the extensive margin, i.e. a specific component of export flows.

2.2. Theoretical motivations for a relation between familiarity and fixed entry costs

2.2.1 Transaction costs and fixed entry costs

A firm that exports to a foreign market has established exchange agreements with customers in the market in question. Such agreements are preceded by transaction costs.

Transaction costs refer to costs of establishing exchange agreements (Williamson 1979, Joskow 1985). North & Thomas (1973) categorize these costs according the three consecutive phases in transaction processes: (i) search costs, (ii) negotiation costs and (iii) monitoring and enforcement costs. Before negotiations a buyer collects information about available products, potential sellers and the price and quality of their respective products. A seller scans markets for potential buyers and informs herself about demand structures, such as customers' willingness to pay for different product attributes, and income patterns. Once a seller and a buyer are matched, the parties negotiate about the terms of a potential contract. This negotiation pertains to contractual liabilities, obligations and penalties, which includes type and time of delivery, product characteristics and form of payments. The third phase refers to costs associated with monitoring and contract enforcement. Monitoring can be done, for instance, through inspection and assessment of the delivered products. If the characteristics of the delivered products – or the general behavior of one part – deviate from the specifications in the contract, the solution is contract enforcement.

Transaction costs preceding an exchange agreement cannot be recovered even if the contract associated with the exchange agreement is abandoned[6]. They are irrevocably committed and fixed because they are paid before the actual delivery takes place. The fixed

[5] This result is comparable with the production and pricing decision of monopolies, in which sunk costs neither affect output nor prices. Also, as ascertained by Buchheit and Feltovich (2005, p.1), standard game-theoretic equilibrium concepts for simultaneous-moves games have the same implication in the sense that a change of the level of a player's payoffs has no effect on the player's best-response correspondence and no effect on equilibrium.

[6]Because of this, high transaction costs can provide an incentive to invest in durable interaction capacity, which point towards rigidities and inertia in trading relations (Johansson & Westin 1994b). However, a discussion of arms' length versus network relations is beyond the scope of this paper.

entry costs a firm needs to pay to enter a foreign market thus depend on the costs of establishing exchange agreements with customers in that market.

Moreover, transaction costs are generic in the sense they pertain to all exchange agreements irrespective of whether the agreements involve domestic or foreign parties. This generality is constructive for the characterization of fixed entry costs. From this perspective, the distinctiveness with exports is that the transactions cost associated with entering foreign markets are presumably higher than those associated with the domestic market. However, albeit they are higher on average, their magnitude is not uniform across foreign markets. One reason for this is variations in familiarity.

2.2.2 *Familiarity and the magnitude of transaction costs*

Familiarity with a foreign market generally alludes to familiarity with general characteristics that permeate the market. Institutions are typical such characteristics and refer to "constraints that structure political, economic and social interaction" (North 1990, p.97). Formal institutions include property rights, judicial systems and constitutions. Informal institutions include norms, traditions and rules of conduct.

Familiarity with the formal and informal institutions in a foreign market reduces uncertainty and barriers pertaining to information and communication. Lower information and communication barriers translate into lower costs associated with search and negotiations. Mutual familiarity allows for the realization of communication and information economies (Williamson 1979). Knowledge of the foreign language is a basic form of familiarity and eases communication in a direct sense. Therefore, it facilitates the development of familiarity with the institutions in the foreign market. Moreover, as familiarity is typically developed through repeated interaction it tends in addition to be correlated with trust (c.f. Gulati 1995). This implies that familiarity affects the costs that are due to uncertainty about future states at the time of negotiations about the terms of a contract.

The transactions-costs literature makes a fundamental distinction between complete and incomplete contracts (Williamson 1979, Joskow 1985, Hart & Holmström 1987, Hart & Moore 1999). Complete contracts are full contingent contracts which encompass a specification of the obligations of each part under all future contingencies. Incomplete contracts, on the other hand, are imperfect in the sense that they do not unambiguously specify the duties of each part in every possible state of nature. As market conditions change over time and uncertainty about future states is the norm rather than the exception, complete contracts are associated with substantial costs. The costs of establishing incomplete contracts are lower, but such

contracts bring about a potential for opportunism *ex post*. Familiarity and trust can compensate for contractual incompleteness (Hart & Holmstrom 1987), as mutual trust implies that the expectations *ex ante* of 'bad behavior' *ex post* are reduced. Put differently, the parties can accept a higher degree of contractual incompleteness – and thereby reduce transaction costs – when an exchange agreement involves environments which they trust and are familiar with[7].

Familiarity has a marked relation to geography. The familiarity with the informal and formal institutions in adjacent markets is typically higher than in distant markets. Likewise, institutions as such have a tendency to be more similar between markets that are located in proximity to each other, e.g. markets that share a common border. One reason for this is high interaction intensity over long time periods. Because of its geographical component, familiarity has been advanced as a potential explanation for the 'missing trade' (Trefler 1995). Extra transaction costs that are correlated with distance on top of transportation cost can explain why the estimated effects of distance in gravity estimations are too large, given the magnitude of actual transport costs (Grossman 1998, Anderson 2000). Several studies have shown that factors pertaining to familiarity have an impact on trade (see Anderson 2000 and Loungani et al. 2002 for overviews of the literature). A typical way in which the effect of familiarity is tested is to include dummy variables in gravity equations that represent a presumed familiarity and affinity (see e.g. Frankel & Rose 2002, Johansson & Westin 1994a, Hacker & Einarsson 2003). In a recent study, Huang (2007) extends this type of analyses by making use of Hofstede's (1980) uncertainty aversion index. The results show that uncertainty-averse countries trade less with countries they are unfamiliar with.

Although the consensus in the literature is that familiarity does augment trade, the mechanism(s) by which it does so has to a large extent remained unresolved. The link between fixed entry costs, transaction costs and familiarity described above suggests that familiarity should primarily represent adjustment on the extensive margin, i.e. a specific component of unilateral export flows. In what follows, this hypothesis is tested empirically by estimating a one-sided gravity model and separating between the extensive (number of exporters) and intensive (exports per firm) margin (c.f. Hummels & Klenow 2005, Andersson 2006) of Sweden's unilateral export flows to 150 destination countries over a sequence of seven years.

[7] The presentation here has a seller perspective. Familiarity can also operate from the customer side, but the methodology applied in subsequent parts of the paper cannot discriminate between 'buyer' and 'seller' familiarity. In either case it reduces fixed entry costs. Section 5 discusses this issue in more detail and raises marketing costs as alternative explanations of results.

3. DATA AND DESCRIPTIVES

3.1. Description of data sources

A distinction between the extensive and intensive margin is made possible by Swedish manufacturing firm-level export data, obtained from Statistics Sweden (SCB). These data cover the period 1997-2003 and report each firm's exports by destination country. Firms correspond to legal entities and are identified by a unique identity number. The number of exporters to a given destination country is then the selection of firms that have registered (i.e. positive) exports to that country.

Data on GDP, GDP per capita and distance were obtained for 150 destination countries[8]. GDP and GDP per capita are extracted from *World Development Indicators* (WDI) 2005 and are measured in constant US dollars[9]. Distances in kilometers from Sweden to the respective destination countries are computed using the latitude and longitude coordinates of the capital in each destination country and the capital of Sweden. The distances in kilometers are then given by the 'circle-formula', which are based on the sphere of the earth and gives the minimum distances along the surface.

3.2. Illustration of the data and descriptive statistics

The Swedish data reveal striking differences in the number of exporters between different markets. For instance, the number of exporters to Norway, which shares a common border with Sweden, is about three times as large as the number of exporters to the US although the Norwegian market in terms of GDP is only 2 % of the US market. In order to provide the reader with a feel for the data, Figures 1-4 illustrates a set of basic relationships between GDP, distance and the extensive and intensive margin, respectively. The relationships are based on average figures 1997-2003 are expressed in logs and are consistent those reported in Eaton et al. (2004) on French export data.

Figures 1 and 2 plot the relationship between the number exporters (i.e. the extensive margin) and distance to and GDP in the destination countries, respectively. Evidently, the number of exporters systematically decreases with distances and increases with market-size. Figures 3 and 4 plot the relationship between average export sales per firm to a destination

[8] A list of the destination countries included in the study can be found in Appendix A

[9] International trade transactions are conducted according to nominal exchange rates, why PPP adjusted figures can distort results. The results presented in subsequent sections are, however, invariant to whether one uses PPP-adjusted data or not. A comparison between PPP-adjusted GDP data and non-adjusted are provided from the author upon request.

country, i.e. the intensive margin of market-specific flows, and distance and GDP respectively. Export sales per firm decreases with distance and increases with GDP.

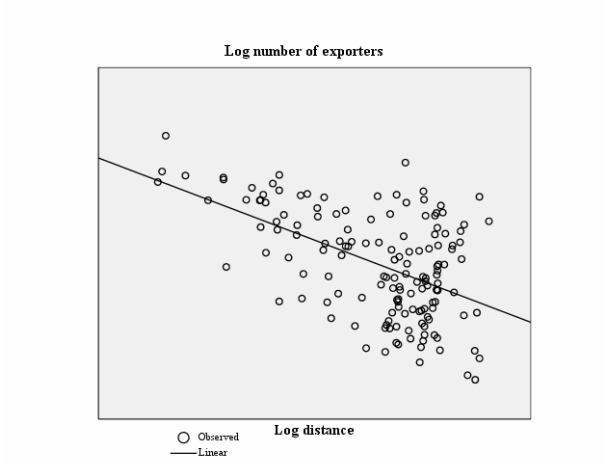

Figure 1. *Number of exporters and distance (in logs).*

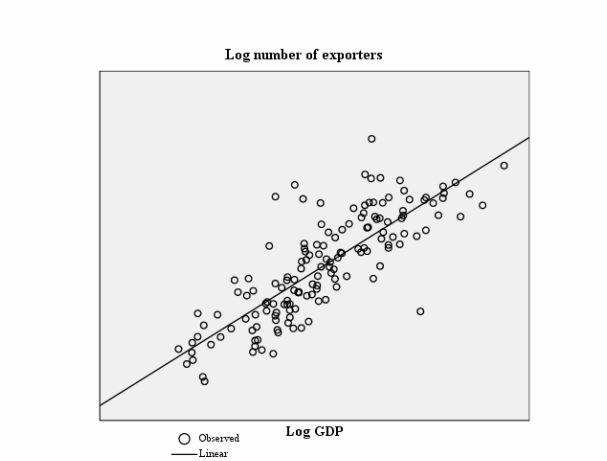

Figure 2. *Number of exporters and GDP (in logs).*

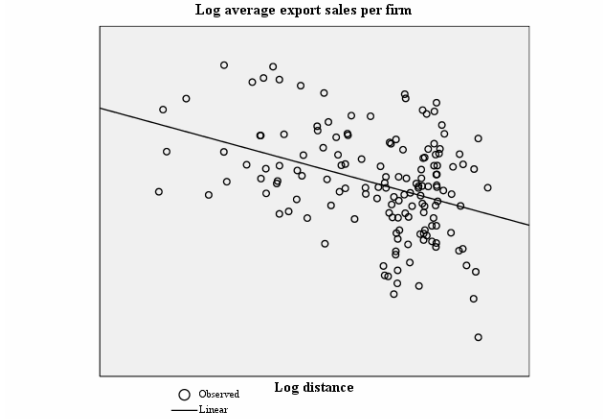

Figure 3. *Average export sales per firm and distance (in logs).*

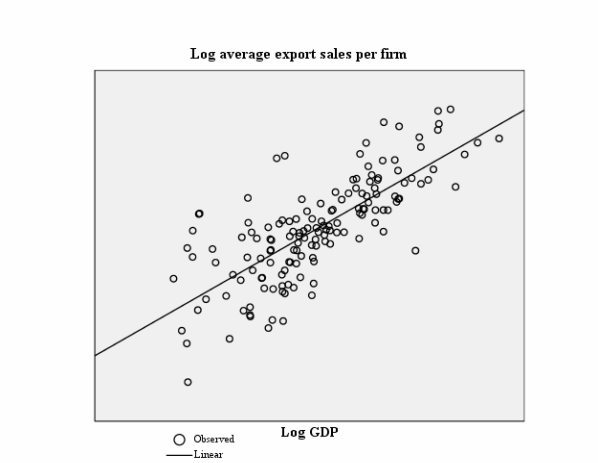

Figure 4. *Average export sales per firm and GDP (in logs).*

Table 2 presents descriptive statistics of the mean values over the period 1997-2003 of Sweden's exports and GDP and GDP per capita in the 150 destination countries in the sample. Evidently, there is great variation in both total the export flows, the intensive and extensive margin across the destination markets. The distribution is skewed to the right, as can be seen form the difference between the mean and the median. A few destination countries are associated with a large number of Swedish exporters, a large intensive margin and large export flows, respectively. The distribution of exports flows across space is highly uneven. The distribution of the data on GDP and GDP per capita described by the figures in the table is illustrious.

Table 2. *Descriptive statistics of continuous variables in the empirical model, (figures based on the variables' mean value 1997-2003).**

Variable	*Mean*	*Median*	*Std. deviation*
Exports (in millions US $)	560.34	21.25	1 557.78
Extensive margin (# export firms)	957.83	180.93	2 331.87
Intensive margin (in thousands US $)	267.22	138.00	350.98
GDP (in billions US $)	184.00	10.71	723 .03
GDP per capita (in thousands US $)	5.80	1.65	8.96
Distance (kilometers)	6 310.02	6 192.00	3 851.07
# obs	150	150	150

***)** The export data are from Statistics Sweden (SCB). GDP and GDP per capita are from World Development Indicators (WDI), expressed in constant US $. Distance refers to the distance in kilometers between Sweden's capital city (Stockholm) and the capital city in each respective destination country.

4. EMPIRICAL ANALYSIS

4.1. Model specification, empirical strategy and estimation issues

Empirical model

As shown in Section 2.1, both the extensive and the intensive margin are functions of standard variables in gravity models, such as market-size (GDP) and distance. Variables that affect each respective margin are relevant for explaining aggregate exports, because total exports to each market are given by the number of exporters and their average exports. The empirical model is a one-sided gravity model. The volume of unilateral export flows from Sweden to a given destination country in each year 1997-2003 is modeled as a function of GDP, GDP per capita, distance and a set of dummy variables. The model is presented in (5):

$$X_{s,t} = \alpha Y_{s,t}^{\beta} (Y_{s,t}^{cap})^{\phi} \exp\{-\lambda d_s + \theta D_s^{Nordic} + \rho D_s^{Baltic} + \varphi D_s^{English} \ldots \\ \ldots + \varsigma D_s^{A,N} - \xi D_s^{Locked} - \gamma D_s^{Is} - \vartheta D_s^{Poor}\} \quad (5)$$

where $X_{s,t}$ denotes the total export volume from Sweden to destination country s in year t. $Y_{s,t}$ is GDP and $Y_{s,t}^{cap}$ is GDP per capita. d_s denotes the distance (in kilometers) from Sweden to country s. GDP per capita reflects the purchasing power in a country. Moreover, it is also a proxy for political stability and quality of institutions (see *inter alia* IMF 2003)[10]. Because of this, uncertainty and expected enforcements costs can be higher in countries with low GDP per capita. d_s denotes the (time-invariant) distance in kilometer from Sweden to country s. Equation (5) implies an exponential distance-decay function. This is motivated by that transport costs per kilometer are more often than not lower for long-distance haulages compared to short-distance ones, i.e. the relationship between transport charges per distance-unit and distance is non-linear. This can be explained by that the choice of mode of transport, with different transport charges per distance unit, varies depending on length of haul.

There are six dummy variables in the model of which three have a presumed bearing on familiarity. These three are: (i) a dummy for Nordic countries, (ii) a dummy for Baltic countries including Poland and (iii) a dummy for countries with English as an official language. In addition, the model includes dummies for Australia and New Zealand, landlocked countries, small remote island economies and poor countries. The motivation and definition of each of these dummy variables are presented in Table 3. The countries represented by the dummies for Nordic and Baltic (incl. Poland) are all countries in

[10] In addition, Knack (2001) reports on a strong correlation between overall trust and GDP per capita.

geographical proximity to Sweden and are presumably familiar to Sweden. The Baltic countries, including Poland, are relatively proximate and have colonial and historic ties with Sweden. The Nordic countries have similar languages[11] and share a common border in addition to a general geographical proximity.

Table 3. *Explanation and motivation for the dummy variables in (13).*

Variable	***Explanation***	Motivation
D_s^{Nordic}	1 if country *s* is a Nordic country, 0 otherwise	Familiarity: common borders, language similarities, cultural proximity, colonial ties
D_s^{Baltic}	1 if country *s* is a Baltic country (including Poland), 0 otherwise	Familiarity: colonial ties (Estonia and Latvia), historic ties, proximity, previous studies (e.g. Johansson & Westin 1994b, Hacker & Einarsson 2003)
$D_s^{English}$	1 if English is an official language in country *s*.	Familiarity: communication costs, low linguistic distance (English studies are mandatory in compulsory school in Sweden)
$D_s^{A,N}$	1 if country *s* is Australia or New Zealand, 0 otherwise	Great distance from Sweden but developed markets with English as their main language.
D_s^{Locked}	1 if country *s* is landlocked (no coastline), 0 otherwise	Higher transport costs, ceteris paribus. Between ⅔ and ¾ of world trade is shipped by water (ocean) carriers (Hummels 1999). The median landlocked country has about 55 % higher transport costs than the median coastal country (Anderson & van Wincoop 2004).
D_s^{Is}	1 if country *s* is a small remote island economy, 0 otherwise	Special case: small markets, tourist economies, remoteness.
D_s^{Poor}	1 if country *s* is poor (GDP per capita less than 3 500 US dollars 1997-2003)	Developing / underdeveloped countries. Special case.

$D^{English}$ represents countries with English as their official language. This set of countries has no direct relation to geographical proximity. However, knowledge of the language in the foreign market reduces communication and information costs and facilitates the development of familiarity with both formal and informal institutions. As noted in the table, although English

[11] As opposed to Norwegian and Danish, Finnish and Swedish have different traits. Swedish is a Germanic language (included in the Indo-European language family) whereas Finnish is a Uralic language (not part of the Indo-European family). However, Swedish is an official language in Finland.

is not an official language in Sweden, English studies are mandatory in compulsory school in Sweden.

The model in (5) also includes a dummy variable for landlocked countries, D^{Locked}, which takes the value 1 if the country has no coastline and 0 otherwise. Hummels (1999) remarks that about two thirds to three quarters of world trade (in terms of value) are shipped via ocean liners. This suggests that shipments of goods to a landlocked country, everything else equal, are associated with higher transport costs than non-landlocked countries. Anderson & van Wincoop (2004), for instance, report that the median landlocked country has on average 55 % higher transport costs than the median coastal country. The coefficient estimate is thus expected to be negative for both the extensive and the intensive margin. New Zealand and Australia are represented by $D^{A,N}$. These countries are located at the greatest distance from Sweden, but are developed countries with English as their official language. An additional dummy controls for small remote island economies. These are small markets with typically undeveloped industry that to a large extent rely on tourism. Given these characteristics, they constitute a special case. The coefficient estimate associated with this dummy variable is therefore expected to be negative. Moreover, D_s^{Poor} controls for poor developing countries.

Taking logs on (5) leads to the equation to be estimated[12]:

$$\ln X_{s,t} = \alpha + \beta \ln Y_{s,t} + \phi \ln Y_{s,t}^{cap} - \lambda d_s + \theta D_s^{Nordic} + \varphi D_s^{Baltic} \ldots$$
$$\ldots + \sigma D_s^{English} + \varsigma D_s^{A,N} - \xi D_s^{Locked} - \gamma D_s^{Is} - \vartheta D_s^{Poor} + \varepsilon_{s,t} \quad (6)$$

The equation describes a panel data model with seven time periods (1997-2003) and 150 groups (destination countries). In line with previous studies, the parameter estimates for dummy variables that pertain to familiarity are expected to be significant and positive. In order to test the hypothesis that their effect on aggregate exports primarily is due to adjustment on the extensive margin, both the intensive and extensive margin are regressed on the right-hand-side (RHS) variables in (6). If the parameter estimates of D_s^{Nordic}, D_s^{Baltic} and $D_s^{English}$ are only significant and positive for the extensive margin but not for the intensive margin, it is consistent with the hypothesis that the effect of familiarity on aggregate trade flows primarily represents adjustments on the extensive margin. The separation between the extensive and the intensive margin is made in the following manner:

[12] Correlations between the independent variables in (6) are presented in Appendix B.

(7) $$\ln X_{s,t} = \ln f_{s,t} + \ln x^f_{s,t} \qquad \ln x^f_{s,t} \equiv \ln\left(X_{s,t} / f_{s,t}\right)$$

where $f_{s,t}$ is the number of exporting firms in Sweden that exports to country *s* in time *t* and $x^f_{s,t}$ is the average export sales per firm to the same country in the same time period. Thus $f_{s,t}$ is the extensive margin and $x^f_{s,t}$ the intensive margin. Regressing $\ln X_{s,t}$, $\ln f_{s,t}$ and $\ln x^f_{s,t}$ separately on the RHS of (6) allows for an empirical assessment of which of the two margins that account for the effect of the variables on aggregate market-specific unilateral export flows. An underlying assumption in this empirical strategy is that all firms that meet the productivity threshold associated with a market exports to the market.

Estimation issues

As the model in (6) only includes three country-specific variables – GDP, GDP per capita and distance – it can be expected that there is heterogeneity among the destination countries not accounted for by the RHS variables. Such heterogeneity can, for instance, be due to unobserved attributes of the link between Sweden and the respective destination countries. A more apparent reason for unobserved country-specific effects is that the price-index in each respective destination country is omitted from the model.

Unobserved heterogeneity can be controlled for by either a fixed or a random effects estimator (Greene 2003, Wooldridge 2002). A merit of the fixed effects estimator is that it is robust to correlation between the unobserved country-specific effects and the independent variables. However, if a model includes time-invariant independent variables, such as distance, this robustness of the fixed effect estimator is of no use because it cannot be applied regardless of whether it is estimated using dummy variables or the 'within transformation' (c.f. Wooldridge 2002). The reason is that it uses the variation over time within each group. Because of this, Wooldridge (2002) maintains that the random effects estimator is an appropriate alternative. If there is no correlation between the unobserved group-specific effects and the independent variables, the random effects estimator is more efficient than the fixed effects estimator because it uses more of the variation in the data, i.e. it uses both the variation within and between groups. The fixed effects estimator can be imprecise if there is little variation in some of the independent variables. Moreover, part of the (presumed) correlation between the independent variable(s) and the unobserved effects can be controlled for by including dummy variables for various groups (Wooldridge 2002, p.288).

For these reasons, the model in (6) is estimated with the random effects estimator. Distance is time-invariant and the dummies for Nordic and Baltic countries controls for familiarity, which is presumably related to distance. Furthermore, there is no specific reason to assume that the price-index in each respective country, which is omitted from the model, has any particular correlation with the independent variables[13]. In the random effects model, the error term in (6), $\varepsilon_{s,t}$, represents a composite error such that:

$$\varepsilon_{s,t} = c_s + u_{s,t} \tag{8}$$

where c_s is a country-specific random error and $u_{s,t}$ is an idiosyncratic error. c_s thus reflects unobserved heterogeneity across destination countries.

4.2. Results – aggregate unilateral exports

Table 4 present estimates of the parameters in (6). The estimates reported in the table are obtained from a random effects estimator adjusted for serial correlation in the idiosyncratic errors. An adjusted Breusch & Pagan (1980) Lagrange-Multiplier (LM) test shows that the null hypothesis of no random effects (i.e. country-specific random error) can be rejected for each model. Likewise, Bera's et al. (2001) robust LM test for serial correlation in the idiosyncratic errors shows that the null hypothesis of no serial correlation can be rejected[14]. The table also reports the estimated autocorrelation coefficient associated with the respective estimations.

The results are in line with the expectations. The 3rd column from the left in the table presents the results obtained for aggregate unilateral export volumes as dependent variable. The fit of the model for aggregate unilateral exports is 0.62. Total exports to a destination increase with GDP decrease with distance. The parameter estimate associated with GDP per capita is positive but insignificant.

[13] Chaney (2006) shows that the endogenously determined price index in a country (in general equilibrium) depends on its own size and an index of its remoteness from the rest of the world. A country's remoteness relative to Sweden can be expected to have a minor impact on each country's index of remoteness.

[14] In addition, Baltagi's & Li's (1991) joint test for random effects and serial correlation suggested random effects and serial correlation in all estimations.

Table 4. *Sweden's exports to 150 destination countries 1997-2003. Estimates of parameters in (6), dependent variables: (i) export volume, (ii) extensive margin and (iii) intensive margin.*[a,b,c,d]

Variable	*Parameter*	*Aggregate export flows (export volume)*	*Extensive margin (# of exporters)*	*Intensive margin (average export volume per firm)*
$\ln Y_s$	β	1.04* (15.07)	0.49* (13.97)	0.45* (6.77)
$\ln Y_s^{cap}$	ϕ	0.09 (0.67)	0.16* (2.41)	-0.05 (-0.32)
d_s	λ	-0.002* (-6.76)	-0.00007* (-4.64)	-0.0001* (-3.91)
D_s^{Nordic}	θ	1.94* (2.84)	1.85* (4.76)	0.08 (0.12)
D_s^{Baltic}	φ	2.50* (3.64)	2.16* (5.54)	0.34 (0.31)
$D_s^{English}$	σ	0.63* (2.42)	0.37* (2.52)	0.15 (0.59)
$D_s^{A,N}$	ς	1.09 (1.13)	0.71 (1.29)	0.23 (0.24)
D_s^{Locked}	ξ	-0.97* (-3.51)	-0.41* (-2.68)	-0.60* (-2.26)
D_s^{Is}	γ	-0.83** (-1.79)	-1.26* (-4.88)	0.05 (0.12)
D_s^{Poor}	ϑ	0.59 (1.50)	-0.28 (-1.38)	0.73** (1.88)
Adj. BP (var(c_s) =0)	-	24.58*	595.21*	70.72*
BSY (AR1)	-	302.35*	45.94*	255.78*
Estimated auto.corr ($\hat{\rho}$)	-	0.35	0.34	0.35
R^2	-	063	0.86	0.26
# obs	-	1 050	1 050	1 050

a) Estimates obtained from a panel data estimation of Swedish exports to 150 destination countries 1997-2003. Random effects estimator adjusted for serially correlated idiosyncratic errors.

b) * indicates significance at the 0.05 level, ** indicates significance at the 0.1 level, *t*-values presented within brackets.

c) Adj. BP refers to the test statistic of an adjusted Breusch & Pagan (1980) Lagrange Multiplier (LM) test for random effects, which works under serially correlated idiosyncratic errors; **H0**: $\text{var}(c_s) = \sigma_s^2 = 0$, see (8) in the main text.

d) BSY refers to the test statistic of Bera's et al. (2001) robust LM-test for serial correlation in the idiosyncratic error, which works in the presence of random effects; **H0**: $E\left(u_{s,t}, u_{s,t-1}\right)$=0, see (8) in the main text.

The parameter estimates associated with the dummy for Nordic and Baltic countries and countries with English as an official language are all significant and positive. The magnitude of the estimated effects are large, economic significant and consistent with previous studies of Swedish unilateral export flows (c.f. Hacker & Einarsson 2004, Johansson & Westin 1994a). The estimated parameter for D^{Nordic} suggests that, all else equal, being Nordic increases Swedish exports with a factor close to seven, $(\exp\{1.94\}=6.96)$[15]. Exports to Baltic countries (incl. Poland) are estimated to be more than 12 times larger than motivated by GDP, GDP per capita and distance alone, $(\exp\{2.50\}=12.18)$. English as an official language almost double Swedish unilateral exports, $(\exp\{0.63\}=1.88)$. It is also evident that landlockedness substantially reduces exports. All else equal, exports to a landlocked country is about 0.4 times as large as to a non-landlocked country, $(\exp\{-0.97\}=0.38)$. As expected exports to small remote island economies are on average lower, whereas D^{AN} and D^{Poor} have no significant impact on aggregate unilateral export volumes.

What kinds of adjustment give rise to these effects on aggregate exports? The 4th and 5th column from the left in Table 4 presents the parameter estimates obtained by regressing the extensive and intensive margin on the RHS variables in (6), respectively. The results for each respective margin show that the parameter estimates associated with D^{Baltic}, $D^{English}$ and D^{Nordic} are only significant for the extensive margin (number of exporters). Although the parameter estimates are positive, the magnitude of the parameters is small and they are not statistically significant. This is consistent with the hypothesis that familiarity pertains to the size of fixed (sunk) entry costs, as predicted from a transaction-costs perspective. The effect of the dummies representing familiarity on aggregate unilateral exports can thus be attributed primarily to adjustments on the extensive margin. Given the described magnitude of the effects on aggregate export volumes, adjustments on the extensive margin are important and can explain a significant part of the variation in aggregate unilateral export flows. This motivates and supports models which combine heterogeneous firms and market-specific fixed entry costs.

The estimated effect of all individual variables in (6) on aggregate export flows can partly be attributed to adjustments on the extensive margin, i.e. differences in the number of

[15] If destination 1 and 2 are similar in all respects except that destination 1 is Nordic whereas destination 2 is not, the difference in the volume of exports to these countries according to the model in (6) is: $\ln x_1 - \ln x_2 = \theta \Rightarrow x_1/x_2 = \exp\{\theta\}$. A similar interpretation applies to all dummies in (6).

exporting firms. GDP per capita has a positive effect on the extensive margin but not on the intensive margin. A potential explanation for this result is the correlation between the overall quality of institutions and the general level of economic development (see IMF 2003), which tends to reduce transaction costs. For the intensive margin, three variables – GDP, distance, landlockedness and the dummy for poor destination countries – are significant[16]. The negative and significant impact of landlockedness on both margins is in line with that landlocked destinations are associated with higher transport costs, i.e. higher variable costs of exporting.

4.2. Robustness

Various methods to assess the robustness of the results presented in Table 4 were applied. The dependent variables – aggregate export flows, the extensive and the intensive margin – are skewed to the right, in the sense that the mean is much larger the median (see Table 2). Does the results remain robust if the parameters are estimated using the conditional median of the dependent variable(s), such that the parameters are estimated by minimizing the absolute deviations? In Appendix C, parameter estimates of the variables in (6) using median regression for (i) aggregate export flows, (ii) the extensive and (iii) the intensive margin are presented. These parameters are estimated with Koenker's & Basett's (1978) quantile regression technique at the 50th quantile, i.e. the median, on average figures 1997-2003 with bootstrapped standard errors, (see Appendix for details). As can be seen from the Appendix, the results prevail when estimated using the conditional median of the dependent variables. Moreover, using average figures 1997-2003, aggregate exports, the extensive and intensive margin were regressed on the RHS variables in (6) using a robust regression technique[17]. This procedure produced identical results as those previously reported, with the exception that the parameter estimate for GDP per capita turned out to be insignificant. Also, the model in (14) was estimated with time dummies to capture time-specific effects, which left results unchanged[18].

The final check of the results is based on the observation that export products have different characteristics which are likely to have an impact on the costs of matching buyers and sellers and the overall magnitude of transaction costs. Rauch (1999) maintains that transactions of differentiated products are in general associated with more extensive search

[16] A peculiar finding here is that the parameter estimate associated with D^{Poor} is positive.
[17] I used iteratively re-weighted least squares in which outliers receive lower weight. The results are available upon request.
[18] These results are available from the author upon request.

and information gathering because of product-specific attributes combined with lack of reference prices. By empirically distinguishing between products traded on organized exchanges, products with reference prices and differentiated products (at the 3-digit and 4-digit SITC levels), Rauch (1999) finds that effects of proximity, language and colonial ties on bilateral trade flows are larger for differentiated products. In view of this, the following question is posed: are the previous results for the extensive margin mainly driven by differentiated products?[19] Export products were classified into (i) products with reference prices and (ii) differentiated products, using the classification developed by Rauch (1999)[20]. This classification is standard and has been applied in other studies, such as Huang (2007). Due to ambiguities in the classification, Rauch (1999) used two alternative classifications, a 'conservative' and a 'liberal'. The former minimized the number of 3-digit and 4-digit products that are classified as either organized exchange or reference priced whereas the latter maximized those numbers.

Tables 5 and 6 present the parameter estimates of the explanatory variables in (14) for the extensive and intensive margin, respectively, for each type of products. There were 150 destination countries for Swedish exports of differentiated products 1997-2003, but 128 and 131 destinations for Swedish exports of products with reference prices with the conservative and liberal classification, respectively. The parameters are estimated using a random effects estimator adjusted for serial correlation in the idiosyncratic errors. As in Table 4, the adjusted Breusch & Pagan (1980) Lagrange-Multiplier (LM) test shows that the null hypothesis of no random effects (i.e. country-specific random error) can be rejected for each model and Bera's et al. (2001) robust LM test for serial correlation in the idiosyncratic errors shows that the null hypothesis of no serial correlation can be rejected. Moreover, each table also reports the estimated autocorrelation coefficient associated with each model.

[19] This is a test of the generality of the results in Table 4. Although the ordering of destination countries in terms of fixed entry costs should be unaffected by product classification, the magnitude of the effects on each margin may be altered.

[20] See the original source, Rauch (1999), for details on this classification. The third type of commodities, i.e. commodities traded on organized exchanges, were excluded as there were too few countries that imported such goods from Sweden during the period of analysis to make comparisons with the other type of goods and the aggregate flows meaningful. As reported in Rauch (1999), commodities traded on organized exchanges accounted for only 12-16 % of worldwide trade flows in 1990s. I used Rauch's (1999) classification provided on Jon Haveman's industry trade data webpage: (http://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeData.html).

Table 5. *Estimated parameters for the extensive margin: commodity classifications according to Rauch (1999), (i) differentiated products and (ii) products with reference prices.* [a,b,c,d]

	Conservative classification		**Liberal classification**	
	Differentiated products	***Products with reference prices***	***Differentiated products***	***Products with reference prices***
$\ln Y_s$	0.51* (13.61)	0.49* (12.52)	0.51* (13.57)	0.53* (13.41)
$\ln Y_s^{cap}$	0.13** (1.81)	0.10 (1.30)	0.13** (1.71)	0.15** (1.91)
d_s	-0.00008* (-4.55)	-0.00007* (-4.12)	-0.00007* (-4.47)	-0.00007* (-4.23)
D_s^{Nordic}	1.98* (4.82)	2.07* (5.27)	1.99* (4.47)	2.07* (5.38)
D_s^{Baltic}	2.28* (5.57)	2.27* (5.71)	2.29* (5.56)	2.31* (5.94)
$D_s^{English}$	0.38* (2.44)	0.17 (1.08)	0.38* (2.49)	0.22 (1.41)
$D_s^{A,N}$	0.82 (1.43)	0.70 (1.26)	0.80 (1.41)	0.69 (1.27)
D_s^{Locked}	-0.40* (-2.45)	-0.33** (-1.89)	-0.40* (-2.42)	-0.21 (-1.21)
D_s^{Is}	-1.21* (-4.41)	-0.84* (-2.33)	-1.20* (-4.40)	-0.96* (-2.29)
D_s^{Poor}	-0.29 (1.37)	-0.30 (-1.34)	-0.30 (-1.41)	0.23 (-1.03)
Adj. BP (var(c_s) =0)	542.78*	277.69*	544.05*	269.22*
BSY (AR1)	43.95*	36.58*	44.53*	36.34*
Estimated auto.corr ($\hat{\rho}$)	0.30	0.24	0.31	0.22
R^2	0.85	0.82	0.85	0.83
# obs	1 050	896	1 050	917

a) Estimates obtained from a panel data estimation of Swedish exports to 150 destination countries 1997-2003. Random effects estimator adjusted for serially correlated idiosyncratic errors.

b) * indicates significance at the 0.05 level, ** indicates significance at the 0.10 level. *t*-values presented within brackets.

c) Adj. BP refers to the test statistic of an adjusted Breusch & Pagan (1980) Lagrange Multiplier (LM) test for random effects, which works under serially correlated idiosyncratic errors; **H0**: $\text{var}(c_s) = \sigma_s^2 = 0$, see (8) in the main text.

d) BSY refers to the test statistic of Bera's et al. (2001) robust LM-test for serial correlation in the idiosyncratic error, which works in the presence of random effects; **H0**: $E(u_{s,t}, u_{s,t-1}) = 0$, see (8) in the main text.

The results for the extensive margin in Table 5 show that the parameter estimate for the dummy variables associated with countries that have English as an official language is only significant and positive for differentiated products. This is consistent with the hypothesis that trade with differentiated products is more dependent on familiarity than products with reference prices. However, the estimated parameters for the dummies for Nordic and Baltic (incl. Poland) countries, respectively, are significant and positive for both differentiated products and products with reference prices.

Taken together, Tables 5 and 6 reveal that the differences in the parameter estimates between the extensive and the intensive margin reported in Table 4 remain for both differentiated products and products with reference prices. The estimated parameters for both D_s^{Nordic}, D_s^{Baltic} and $D_s^{English}$ are insignificant for the intensive margin. However, the dummy for Australia and New Zealand has a positive and significant parameter estimate for differentiated products. It is also evident that the parameter estimate for GDP per capita is insignificant for both types of products. Moreover, in Table 5 the estimated parameter for distance is lower for products with reference prices than for differentiated products. In Table 5, the estimated parameter for the distance variable is negative but insignificant in the case of products with reference prices. The difference between differentiated products and products with reference prices as regards the magnitude of the effect of distance is in line with previous findings on aggregate bilateral export flows, such as Rauch (1999) and Huang (2007). However, this difference in parameter estimates, however, is not apparent for the extensive margin in Table 5.

In summary, the results presented in Table 4 for aggregate export volumes holds for both differentiated products and products with reference prices: the effect of familiarity on exports – as manifested by parameter estimates associated with familiarity dummy variables – is primarily due to adjustments on the extensive margin (number of exporters).

Table 6. *Estimated parameters for the intensive margin (volumes): commodity classifications according to Rauch (1999), (i) differentiated products and (ii) products with reference prices.* [a,b,c,d]

	Conservative classification		**Liberal classification**	
	Differentiated products	***Products with reference prices***	***Differentiated products***	***Products with reference prices***
$\ln Y_s$	0.34* (6.37)	0.58* (8.90)	0.33* (6.21)	0.57* (8.97)
$\ln Y_s^{cap}$	0.04 (0.41)	0.04 (0.33)	0.05 (0.47)	-0.04 (-0.33)
d_s	-0.0001* (-6.18)	-0.00004 (1.24)	-0.0001* (-6.22)	-0.00004 (-1.23)
D_s^{Nordic}	0.30 (0.57)	0.47 (0.79)	0.23 (0.43)	0.46 (0.78)
D_s^{Baltic}	0.51 (0.96)	0.95 (1.54)	0.50 (0.92)	0.97 (1.62)
$D_s^{English}$	0.11 (0.56)	0.13 (0.55)	0.14 (0.69)	0.08 (0.32)
$D_s^{A,N}$	1.38** (1.84)	-0.18 (-0.22)	1.42** (1.85)	-0.08 (-0.10)
D_s^{Locked}	-0.59* (-2.79)	-0.72* (-2.72)	-0.61* (-2.82)	-0.59* (-2.20)
D_s^{Is}	-0.16 (-0.44)	0.25 (0.45)	-0.12 (-0.31)	0.33 (0.66)
D_s^{Poor}	0.67* (2.23)	0.46 (1.23)	0.67* (2.19)	0.31 (0.83)
Adj. BP (var(c_s) =0)	510.03*	315.42*	520.49*	378.53*
BSY (AR1)	50.79*	60.48*	52.61*	64.37*
Estimated auto.corr ($\hat{\rho}$)	0.23	0.16	0.25	0.19
R^2	0.52	0.49	0.51	0.49
# obs	1 050	896	1 050	917

a) Estimates obtained from a panel data estimation of Swedish exports to 150 destination countries 1997-2003. Random effects estimator adjusted for serially correlated idiosyncratic errors.

b) * indicates significance at the 0.05 level, ** indicates significance at the 0.10 level. *t*-values presented within brackets.

c) Adj. BP refers to the test statistic of an adjusted Breusch & Pagan (1980) Lagrange Multiplier (LM) test for random effects, which works under serially correlated idiosyncratic errors; **H0**: $\text{var}(c_s) = \sigma_s^2 = 0$, see (8) in the main text.

d) BSY refers to the test statistic of Bera's et al. (2001) robust LM-test for serial correlation in the idiosyncratic error, which works in the presence of random effects; **H0**: $E(u_{s,t}, u_{s,t-1}) = 0$, see (8) in the main text.

5. CONCLUSIONS AND DISCUSSION

Summary and conclusions

Although fixed entry costs play an important role in explanations of the observed heterogeneity among exporters in terms of the extent of their export activities, the existing literature has paid little attention to explanations of the nature and variation of such costs across different markets.

This paper proposed that fixed entry costs are related to familiarity. It was further maintained that such a relationship does not only help to clarify the nature and variation of fixed entry costs; it also suggests a precise mechanism through which familiarity affects trade. If higher familiarity translates into to lower fixed entry costs, the trade-augmenting effect of familiarity on aggregate trade flows should primarily represent adjustments on the extensive margin (number of exporters). Fixed entry costs enter in the decision of whether to export or not to a given market, but not in the decision of how much to export since they are already paid. Notwithstanding the well-documented effect of familiarity on trade, hitherto the mechanism by which familiarity enhances exports has to a large extent remained unresolved.

Using a one-sided gravity equation augmented with dummies for familiarity – estimated on a panel describing Swedish unilateral exports to 150 destination countries over seven years – it was shown that the effect of familiarity on the volume of aggregate exports is primarily due to adjustments on the extensive margin. The results are thus consistent with the hypothesis that familiarity is associated with the size of fixed (sunk) entry costs. The magnitude of the effect of familiarity on aggregate export flows shows that adjustments on the extensive margin are large and economic significant. Moreover, by applying the commodity classification in Rauch (1999), it was further shown the effect of familiarity on the extensive margin holds for both products with reference price and differentiated products. Language familiarity, though, had only a significant effect on the extensive margin for differentiated products.

The findings in the paper support general equilibrium models that owe to the export decision of individual firms and incorporate firm heterogeneity, such as Chaney (2006) and Eaton et al. (2005). The results also shed light on the nature and variation of fixed (sunk) entry costs across markets. In doing so, they partly elucidate the 'mystery of the missing trade' (Trefler 1995). Anderson (2000) maintains that there must be extra transaction costs on top of distance. As familiarity has a geographical component these extra costs can (at least partly) be attributed to fixed sunk costs of entry, which give rise to adjustments on the extensive margin that are larger than what is motivated by transportation costs alone. However, familiarity

extends beyond geography. The results also suggest that language familiarity, which has no direct link to geography, pertains to the magnitude of fixed entry costs and enhances trade through the extensive margin.

Extensions and unresolved issues – a discussion

The research in this paper can be extended along a number of lines. The empirical strategy rested on an assumption of a non-uniform distribution of productivities across exporting firms and that this (combined with productivity thresholds) imply that not all firms export to all markets. Although it is well established that exporters are more productive than non-exporters (see e.g. the surveys in Tybout 2003, Greenaway & Kneller 2005 and Wagner 2006) the actual productivity of firms exporting to different markets was not observed. An avenue for future research is to estimate export productivity premiums for distinct markets, such that the difference in productivity between non-exporters and exporters for specific destinations is estimated. These market-specific export productivity premiums can then be explained by characteristics, such as familiarity, of destinations. A study of this type, however, requires more detailed information on firm-specific attributes. The study by Ruane & Sutherland (2005), which finds that firms that export globally are more productive and larger than those that export locally, is a step in this direction.

A further topic for future research concerns the measurement and interpretation of familiarity effects. This paper applied dummy variables for groups of countries with which Swedish producers are presumably familiar and the analysis rested on the assumption that familiarity with a market makes sellers better equipped to penetrate the market. It should be recognized, however, that familiarity can also operate from the customer side and that the methodology applied in the paper cannot discriminate between 'buyer' and 'seller' familiarity. Transaction costs also include marketing costs. If customers are familiar with products from a foreign market, producers in that foreign market can, *ceteris paribus*, experience lower entry costs even though they do not have any particular familiarity with the institutions in the destination. Put simply, sellers may not know anything about a destination market, but consumers in that market can be familiar with the sellers' products. This can partly explain why large firms with global brand names can enter many different markets at lower costs. It is established in the marketing literature that consumers, either explicitly or implicitly, use the country of origin (COO) on a symbolic level, i.e. as an associative link (Bilkey & Nes 1982, Schaefer 1997, Insch & McBride 2004). Perceptions of product attributes have been shown to be related to the level of socio-economic and technological development

(Kaynak & Kara 2000) and there is evidence of 'country-stereotyping' (Samiee 1994, Kim & Chung 1997). In terms of costs and efforts needed to penetrate a foreign market, sellers can thus benefit from originating from a country with a strong 'image' internationally. Media coverage, product placements in television and movies, cultural influence are examples of factors that play a role for such an image and tend to correlate positively with the level of socio-economic and technological development[21].

All of the above are examples of buyer rather than seller familiarity, but both effects can of course coexist and operate at the same time. Both also reduce the magnitude of fixed entry costs as they affect transaction costs[22].

In order to disentangle buyer and seller familiarity more sophisticated measures of familiarity which separate between buyer and seller are needed. Research in this vein has policy relevance since export promotion policies can be made along two fundamental routes: (i) targeting domestic firms and (ii) targeting potential customers in foreign markets.

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[21] Research has also shown that consumers evaluate products after their success in other markets (see Takada & Jain 1991). A firm that has successfully penetrated a 'lead' market with high media coverage faces lower costs of penetrating 'follower' markets: e.g. all else equal, a new consumer durable good can be easier to sell in Asia if it has successfully been adopted by US consumers.

[22] It can however be conjectured that the effect of buyer familiarity with sellers' products is in relative terms more significant for final consumer goods than intermediate goods. In the case of final consumer goods, product attributes, warranties and deliveries are more often than not standardized in comparison with transactions of intermediate goods.

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APPENDIX A. *The 150 destinations in the study*

Table A1. *The 150 destinations in the study*

Albania	Colombia	Honduras	Moldova	Solomon Islands
Algeria	Congo, Rep.	Hong Kong, China	Mongolia	South Africa
Angola	Costa Rica	Hungary	Morocco	Spain
Antigua and Barbuda	Croatia	Iceland	Mozambique	Sri Lanka
Argentina	Czech Republic	India	Namibia	St. Kitts and Nevis
Armenia	Denmark	Indonesia	Nepal	St. Lucia
Australia	Djibouti	Iran, Islamic Rep.	Netherlands	St. Vincent and the Grenadines
Austria	Dominica	Ireland	New Zealand	Sudan
Azerbaijan	Dominican Republic	Israel	Nicaragua	Swaziland
Bangladesh	Ecuador	Italy	Niger	Switzerland
Barbados	Egypt, Arab Rep.	Jamaica	Nigeria	Syrian Arab Republic
Belarus	El Salvador	Japan	Norway	Tajikistan
Belgium	Eritrea	Jordan	Pakistan	Tanzania
Belize	Estonia	Kazakhstan	Panama	Thailand
Benin	Ethiopia	Kenya	Papua New Guinea	Togo
Bolivia	Fiji	Korea, Rep.	Paraguay	Tonga
Bosnia and Herzegovina	Finland	Kuwait	Peru	Trinidad and Tobago
Botswana	France	Lao PDR	Philippines	Tunisia
Brazil	Gabon	Latvia	Poland	Turkey
Bulgaria	Gambia, The	Lebanon	Portugal	Turkmenistan
Burkina Faso	Georgia	Lesotho	Romania	Uganda
Burundi	Germany	Lithuania	Russian Federation	Ukraine
Cambodia	Ghana	Luxembourg	Rwanda	United Kingdom
Cameroon	Greece	Madagascar	Samoa	United States
Canada	Grenada	Malawi	Saudi Arabia	Uruguay
Cape Verde	Guatemala	Malaysia	Senegal	Uzbekistan
Central African Republic	Guinea-Bissau	Malta	Sierra Leone	Vanuatu
Chad	Guinea	Mauritania	Singapore	Venezuela, RB
Chile	Guyana	Mauritius	Slovak Republic	Yemen, Rep.
China	Haiti	Mexico	Slovenia	Zambia

APPENDIX B. *Correlations between independent variables in (14)*

Table A2. *Correlations between independent variables in (6).*[a]

	$\ln Y_s$	$\ln Y_s^{cap}$	d_s	D_s^{Nordic}	D_s^{Baltic}	$D_s^{English}$	$D_s^{A,N}$	D_s^{Locked}	D_s^{Is}	D_s^{Poor}
$\ln Y_s$	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-
$\ln Y_s^{cap}$	**0.59***	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-
d_s	**-0.26***	**-0.18***	**1**	**-**	**-**	**-**	**-**	**-**	**-**	-
D_s^{Nordic}	**0.12***	**0.28***	**-0.24***	**1**	**-**	**-**	**-**	**-**	**-**	-
D_s^{Baltic}	**0.02**	**0.07**	**-0.20***	**-0.03**	**1**	**-**	**-**	**-**	**-**	-
$D_s^{English}$	**-0.19***	**0.05**	**0.36***	**-0.10**	**-0.10**	**1**	**-**	**-**	**-**	-
$D_s^{A,N}$	**0.12**	**0.17***	**0.31***	**-0.19**	**-0.09**	**0.19***	**1**	**-**	**-**	-
D_s^{Locked}	**-0.20***	**-0.28***	**0.15**	**-0.08**	**-0.08**	**-0.13**	**-0.06**	**1**	**-**	-
D_s^{Is}	**-0.41***	**0.07**	**0.25***	**-0.05**	**-0.05**	**0.34***	**-0.04**	**-0.16**	**1**	-
D_s^{Poor}	*-0.44*	*-0.84**	*0.18**	*-0.20**	*-0.21**	*-0.09*	*-0.14*	*0.21**	*0.09*	*1*

a) * denotes significance at the 0.05 level.

APPENDIX C. ***Median estimation of the parameters in (6) (average figures 1997-2003).***

The median estimator follows the estimation procedure developed in Koenker & Basett (1978). Parameters are estimated by minimizing the absolute deviations:

$$\text{(A.1)} \qquad \min \frac{1}{n}\left(\sum_{i:y_i \geq x_i'\beta} \left|y_i - x_i'\beta\right| \theta + \sum_{i:y_i < x_i'\beta} \left|y_i - x_i'\beta\right| (1-\theta)\right)$$

where $0 < \theta < 1$ is 0.5 (50th quantile, the median), such that positive and negative residuals get equal weight.

Table A3. *Median estimation of parameters in (6); aggregate export flows, extensive and intensive margin; (average values 1997-2003, bootstrapped standard errors with 1000 replications).*[a]

Variable	*Parameter*	*Aggregate export flows (export volume)*	*Extensive margin (# of exporters)*	*Intensive margin (average export volume per firm)*
$\ln Y_s$	β	0.99* (10.48)	0.56* (13.65)	0.42* (6.33)
$\ln Y_s^{cap}$	ϕ	0.04 (0.19)	0.28* (2.46)	-0.17 (-1.11)
d_s	λ	-0.0002* (-5.48)	-0.0001* (-4.32)	-0.0001* (-3.07)
D_s^{Nordic}	θ	2.17* (4.49)	1.59* (3.59)	0.10 (0.22)
D_s^{Baltic}	φ	2.84* (3.38)	1.58* (2.28)	0.41 (0.93)
$D_s^{English}$	σ	0.41** (1.76)	0.32** (1.75)	0.04 (0.18)
$D_s^{A,N}$	ς	0.96 (1.45)	0.56 (1.24)	0.28 (0.65)
D_s^{Locked}	ξ	-1.09* (-3.06)	-0.51* (-1.97)	-0.71* (-3.14)
D_s^{Is}	γ	-0.74 (-1.21)	-1.05* (-3.31)	0.14 (0.26)
D_s^{Poor}	ϑ	0.40 (0.76)	-0.18 (-0.59)	0.28 (0.71)
Pseudo R^2	-	0.69	0.70	0.45
# obs	-	150	150	150

a) * denotes significance at the 0.05 level, ** denotes significance at the 0.1 level. *t*-values presented within brackets.