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# The Change of Sales Modes in International Markets – Empirical Results for German and British High-Tech Firms

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## Non-technical Summary

When entering into a foreign market, a firm has to choose an appropriate sales mode. This choice belongs to the firm's most important strategic decisions. Firstly, it determines the amount of resources a firm has to invest in establishing business relationships with its foreign partners and customers. Secondly, the way of organising the firm's distribution and logistics depends crucially on the chosen sales mode. Finally, it affects the level of control the exporting firm possesses over its international transactions. Considering the far-reaching consequences of the choice of a sales mode, it is important that the selected foreign sales mode best suits a firm's available resources and capabilities. However, these resources and capabilities change over time. Hence, it might be necessary for a firm to adjust its foreign sales mode to these changing firm-specific conditions. Otherwise, its selected sales mode might become inappropriate for selling the firms' products abroad.

This paper examines a longitudinal data set of German and British technology-oriented firms founded between 1987 and 1996, inclusive. Firms operating in high-tech sectors presumably experience profound changes during an early stage of their life cycles. Thus, it is of special interest under which conditions firms of this particular sample change their foreign sales modes. The firms were contacted using two surveys conducted simultaneously in Germany and the UK in 1997 and 2003. Both in 1997 and 2003, just under three-quarters of the sampled firms had international sales. The two most frequently used sales modes were direct exports and exporting via an intermediary. There is a high persistence in the chosen sales mode over time, probably because of the existence of sunk costs an exporter has to pay when entering into a foreign market or because of binding contracts an exporter made with its foreign distributors or customers. Nevertheless, we observe changes from direct exports to exporting via an intermediary as well as transitions in the opposite direction. The former mode of transition took place primarily in the period between target market entry and the time the first survey was conducted, whereas a transition from an intermediary to direct exports was observed primarily in the period between the two surveys.

Estimating the probabilities of these two modes of transition, the results confirm the importance of the firm's physical and intangible resources as well as the influence of transaction-specific assets on a sales mode change. The main managerial implication of this paper's analyses is that an exporter of a high-tech product which incorporates highly sophisticated technologies should use an integrated sales mode, that is, in the case of a young and small high-tech firm, direct exporting. However, the influence of a firm's resources and transaction-specific assets might be dominated by strategic considerations that are not covered by our data. For example, a young high-tech firm will resort to an intermediary regardless of its resources and transaction-specific assets if this is the only way of coming into contact with foreign customers ("liability of alienness"). Thus, in order to explain the selection of sales modes by young high-tech firms, the theories usually applied are useful but not sufficient.

# The Change of Sales Modes in International Markets – Empirical Results for German and British High-Tech Firms *

by

Helmut Fryges**

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**Abstract**: The choice of the appropriate sales mode belongs to the firm's most important strategic decisions after entering into a foreign market. Thus, it is important that the selected foreign sales mode best suits a firm's available resources and capabilities. However, these resources and capabilities change over time. Therefore, it might be necessary for a firm to adjust its foreign sales mode to these changing firm-specific conditions. Using a longitudinal data set of newly founded technology-based firms in Germany and the UK, this paper applies logistic regressions and analyses empirically the probabilities of changing between the two sales modes most frequently used by the sampled exporters: direct exports and exporting via an intermediary. The estimation results confirm the importance of the firm's physical and intangible resources as well as the influence of transaction-specific assets on a sales mode change. However, the effects of the latter factors might be dominated by strategic considerations that are not covered by our data. For example, a young high-tech firm will resort to an intermediary regardless of its resources and transaction-specific assets if this is the only way of coming into contact with foreign customers.

**Keywords:** *High technology industries, internationalisation, sales modes.*

**JEL Classification:** *F23, L60, L86*

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## 1 Introduction

The choice of the appropriate sales mode belongs to the firm's most important strategic decisions after entering into a foreign market. Firstly, it determines the amount of resources a firm has to invest in establishing business relationships with its foreign partners and customers. Secondly, the way of organising the firm's distribution and logistics depends crucially on the chosen sales mode. For example, if a firm decides to export directly by using the Internet it will have to build up an electronic trade platform on its server and reorganise its logistics and workplaces in order to guarantee a smooth handling of the orders it receives from abroad via the Internet. Alternatively, a firm that sells its product via a foreign distributor or agent needs to provide, for example, technical training of the foreign intermediary's sales personnel and has to create incentives and monitoring mechanisms for controlling the foreign partner. Finally, the sales mode used determines the level of control the exporting firm possesses over its international transactions. If the exporter choose a sales mode that is integrated in its hierarchical structure like direct exporting or a foreign direct investment (FDI), this will ensure a high level of control. On the other hand, firms that export their products via an intermediary or that enter the foreign market via an acquisition or a joint venture with a strategic foreign partner have only a limited control over production and distribution of their products in the target country. Moreover, working together with a foreign partner also means that the domestic firm has to transfer its (technological) know-how to the foreign partner in order to enable it to produce or distribute the domestic firm's products. Thus, using a non-integrated sales mode implies a loss of control over the firm-specific know-how that often constitutes the firm's competitive advantage.[1]

Considering the far-reaching consequences of the choice of a sales mode, it is important that the selected foreign sales mode best suits a firm's available resources and capabilities. However, these resources and capabilities change over time. Firms grow and shrink, accumulate financial and physical capital, develop new products and introduce them into their domestic and foreign markets. Accordingly, it might be necessary for a firm to adjust its foreign sales mode to these changing firm-specific conditions. Otherwise, its selected sales mode might become inappropriate for selling the firms' products abroad. Unfortunately, the theoretical and empirical literature almost entirely neglects changes of sales modes. The internationalisation process model derived by Johan-

[1] The importance of choosing the appropriate sales mode also lies in the fact that that the firm's success in a particular target market will likely depend on the chosen sales mode. This question is, however, beyond the scope of this paper. The relationship between foreign sales mode and firm performance is examined, e.g., by Beamish and Nitsch (1999), Zahra et al. (2000), and Lu and Beamish (2001).

son and Vahlne (1977, 1990) describes a sequence of sales modes. However, this theoretical model is rather deterministic and its only, or at least its most important explanatory variable is the experiential knowledge a firm has acquired in a foreign target market. Thus, it is questionable whether this model is able to account for all the changing conditions a firm might be faced with. Probably due to data restrictions, most empirical studies that examined foreign sales modes concentrate on the firm's entry mode, i.e., the first sales mode a firm uses in a particular target market. Subsequent changes of sales modes are, or have to be, neglected.[2]

This paper addresses this gap. It analyses empirically changes of sales modes using a longitudinal data set of newly founded technology-based firms (NTBFs) in Germany and the UK. For these firms, international business activities are regarded as crucial for growth and long-term survival since sales potentials in their domestic European markets are limited (see, e.g., Bürgel et al. 2004). Moreover, firms operating in high-tech sectors presumably experience profound changes during their life cycles. Thus, provided that the firms have internationalised, it is of special interest under which conditions firms of this particular sample change their foreign sales modes.

This paper's empirical research is based on two surveys that were conducted simultaneously in Germany and the UK. In 1997/1998, a joint research team comprised of analysts from the London Business School and the Centre for European Economic Research (ZEW) contacted a stratified random sample of German and UK-based NTBFs founded between 1987 and 1996 by sending out a written questionnaire (see Bürgel et al. 2004). In the summer of 2003, all surviving firms from the original sample (about 25 % of the firms had already dissolved), which were then 12 years old on average, were contacted once again. In order to ensure a high response rate, computer-assisted telephone interviews (CATI) were used. A response rate of 55 % was obtained, and, after several consistency checks were performed, 217 companies were retained for the longitudinal analyses.

Both in 1997 and 2003, just under three quarters of the sampled firms had international sales. The two most frequently used sales modes were direct exports and exporting via an intermediary. Our results show a high persistence in the chosen sales mode over time, probably because of the existence of sunk costs an exporter has to pay when entering into a foreign market or because of binding contracts an exporter made with its foreign distributors or customers. Nevertheless, we observe changes from direct exports to exporting via an intermediary as well as transitions in the opposite direction. The former mode of transition took place primarily in the period between target

[2] Beamish and Nitsch (1999) provided a longitudinal analysis of entry modes. However, the authors did not focus on the firm-specific conditions for a sales mode change but attempted to explain why they did not find any performance differences between a joint venture and a greenfield investment when examining a longitudinal data set.

market entry and the time the first survey was conducted, whereas a transition from an intermediary to direct exports was observed primarily in the period between the two surveys.

Applying logistic regressions, the probabilities of these two modes of transition are analysed in this paper. The results confirm the importance of the firm's physical and intangible resources as well as the influence of transaction-specific assets on a sales mode change, according to the hypotheses derived from the literature. However, especially during the early stages of a firm's international engagement the effects of these theoretically derived factors are often dominated by the existence of traditional distribution channels and by additional strategic and structural considerations that are not covered by our data. Consumer goods, e.g., are traditionally sold via intermediaries. Thus, this sales mode is also preferred abroad. Moreover, young high-tech firms often decide to use an intermediary since it is the only way of coming into contact with foreign customers, even though a non-integrated sales mode does not optimally suit the exporter's resources.

Section 2 of the paper reviews the main theoretical models derived from the literature to explain sales modes in foreign markets. The data used for the empirical analysis as well as some descriptive statistics are presented in section 3. The econometric implementation is described in detail in section 4, and the estimation results are discussed in section 5; section 6 concludes.

## 2 Theoretical Background

Several theories have been developed to explain the foreign market entry of firms. The main strands of theory are summarised by Malhotra et al. (2003) who synthesised these different theories in order to derive a multitheoretical framework of internationalisation and entry mode choice. Taking the theoretical review of Malhotra et al. as a starting point, I briefly present the existing theories as far as they are relevant for the behaviour of the firms in our sample.[3] The theories reviewed include: internationalisation process theory, the resource-based view of the firm in which theories of organisational capabilities are rooted, transaction-cost analysis theory, and the eclectic

[3] In addition to the theories presented in this paper, the review of Malhotra et al. (2003) includes, among others, international product life cycle theory, originally developed by Vernon (1966). This theory describes a four-stage sequence (domestic production and exports, foreign production, competition of foreign firms in the foreign market, foreign firm production and importing to the domestic market) contingent on the stage of the product's life cycle. However, since the firms in our sample all belong to a high-tech sector, presumably producing a product at an early stage of its life cycle, this theory is not suitable to discriminate between the varying foreign market entry modes of our sampled firms. Another theoretical approach neglected in this paper is network theory (e.g., Coviello and McAuley 1999, Coviello and Martin 1999, Bell 1995). Of course, networks are extremely important for young and small high-tech firms like those in our sample. However, the two surveys this paper's empirical analysis is based on (see section 3) do not include any information on networks used by the firms in the context of their internationalisation process. Thus, we are unable to examine any hypothesis that could be derived from network theory.

paradigm. After reviewing these four theories, I will discuss possible differences in entry mode selection between manufacturing and service firms, both of which are included in our sample. Finally, I will address the time-dependent process of changes in foreign sales modes. Most of the theories that will be discussed below do not explicitly deal with sales mode changes but are restricted to the choice of optimal mode when the firm is entering into the foreign market for the first time. Thus, it is worth discussing briefly the extent to which the reviewed theories are relevant for explaining changes in foreign sales modes.

Two notes have to be made first. Most theories investigating foreign market entry consider large companies that have to choose, for instance, between exporting and foreign direct investment (FDI). Even in the case of internationalisation process theory where a small firm starts its international business activities with no regular exports and a low resource commitment (see below), the final stage is FDI and foreign production – assuming continuous firm growth during the internationalisation process. However, the majority of firms stay small, never growing into a multinational firm with foreign subsidiaries. Nevertheless, the arguments derived in the existing theories remain appropriate, although, when examining young and small firms, we distinguish only between two alternative ways of exporting (direct exporting to end-users versus exporting via an intermediary; see section 3): The degree of resource commitment and the level of control of transactions are both relevant to discriminating between different modes of exporting, even if, for example, the resources actually committed to the foreign market are markedly smaller than in the case of FDI. Further, it should be noted that in the following, the decision whether to export or not is taken as given, i.e., only the group of exporters will be considered. There are several theoretical and empirical studies that examine individual firms' export market participation (e.g., Roberts and Tybout 1997, Bernard and Wagner 2001, Bernard and Jensen 2004, or, for this paper's firm sample, Fryges 2004a). Moreover, some of the theories discussed below are also appropriate for deriving firm-specific variables that are supposed to influence the export decision. Thus, the decision on the optimal entry mode might not be independent of the decision to sell abroad. This possible correlation will nevertheless be neglected.

One of the most influential theories is the internationalisation process model developed by Johanson and Vahlne (1977, 1990). They regard internationalisation as a gradual process in which firms incrementally increase their commitment in foreign markets. A commitment is always associated with uncertainty. The firm extends its international business activities until its particular maximum tolerable risk is reached. This is a function of the degree of the firm's risk aversion and resource position. The commitment of resources to a foreign market increases knowledge of that market and thus reduces any existing uncertainty about the foreign environment, which in turn induces an

additional commitment to this market. The internationalisation process is therefore combined with a dynamic learning process over time, during which the firm acquires experiential knowledge about the foreign market.

The internationalisation process model is the basis of the so-called "stage" models of internationalisation (e.g., Bilkey and Tesar 1977, Bilkey 1978). In these theories the internationalisation behaviour of a firm is linked with different stages of the firm's life cycle. According to this model, a firm pursues the following stages: (i) no regular exports; (ii) exports via an intermediary; (iii) foreign sales subsidiary; (iv) foreign production (FDI). Thus, a firm chooses a sequence of foreign sales modes in order of their resource intensity.

The most important criticism of the internationalisation process model and especially of stage theories is the quasi-deterministic character of the models (Reid 1983). The argument is that firms can and will decide on an optimal entry mode and on expansion of their international activities contingent on market conditions. There is no need to proceed in the incremental way described by the model. Johanson and Vahlne have themselves already listed three exceptions where firms are likely to deviate from the gradually expanding commitment predicted by their model. Firstly, large firms may have enough resources to take larger, i.e., more resource-intensive steps in their internationalisation process. Secondly, relevant knowledge that reduces uncertainty in a foreign market can be acquired by means other than one's own experience, for example by employing an internationally experienced manager. Finally, if market conditions in different foreign markets are homogenous, firms may generalise experience gained in one market to make larger internationalisation steps in another.

The resource-based view (RBV) of a firm (e.g., Penrose 1959, Wernerfelt 1984) analyses how resources are accumulated and deployed by firms. A firm is interpreted as an idiosyncratic bundle of assets (physical resources as well as intangible resources like know-how, experience or tacit knowledge). Since physical assets are relatively easily obtained or imitated, a firm differentiates itself from its rivals by the intangible resources it possesses. These determine how efficiently physical assets can be used and are therefore vital to the firm's performance. Based on the RBV, Madhok (1997) developed the organisational capability (OC) perspective of the firm. The OC framework proposes that a firm's entry mode depends on the nature of the resource advantage a firm possesses. If a firm's advantage is inimitable and difficult to transfer to other firms, such as intermediaries, without loss in value (e.g., tacit knowledge), the exporter will prefer a high level of control over transactions (hierarchical structure, internalisation). In contrast, if the firm's routines and strategies (i.e., its idiosyncratic way of doing business) are highly specific and thus difficult to

transfer to a foreign environment without loss in value, an intermediary will be favoured as sales mode. Madhok called this the "locational effect" (Madhok 1997, p. 48).

Thus, the internationalisation process model and the OC framework both emphasise the role of the firm's intangible assets (in particular, experiential knowledge) for its choice of the optimal entry mode. However, whereas the former theory only distinguishes between different entry modes according to the level of resource commitment, the OC framework differentiates by the level of control, i.e., whether transactions are carried out internally or whether a third partner, an intermediary, is involved.[4]

In contrast to theoretical approaches that concentrate on firm-specific resources, the transaction-cost analysis (TCA) theory regards a firm as a governance structure (Williamson 1985). A transaction is conducted internally if the costs of an economic exchange in a market exceed those of a transaction within the organisational structure of a firm. The TCA theory assumes bounded rationality and opportunistic behaviour of decision-makers. However, the unit of analysis is not the decision-maker itself, but the individual transaction. The optimal foreign market entry mode is chosen by minimising the transaction costs. Anderson and Gatignon (1986) described the entry mode choice as a trade-off between control (the benefit of internalisation) and the costs of resource commitment (the costs of internalisation) under conditions of risk and uncertainty. The authors derived several propositions of how transaction-specific assets may influence the desired level of control. A high level of control will be preferred if a firm's product is technically sophisticated (i.e., it incorporates a higher proprietary knowledge), is unstructured and poorly understood, requires intense product customisation, or can be classified as an immature product. Novel technology that is incorporated in a (new) product is often not yet codified and therefore difficult to transmit to an intermediary. Thus, direct exporting is preferable.[5] Intense product customisation demands close contact to customers, leading to a high reliance of the decision-maker (i.e., the domestic firm) on these working relationships with its key customers. It is proposed that the domestic firm is interested in controlling these important relationships.

In addition to transaction-specific assets, Anderson and Gatignon hypothesised how external and internal uncertainty affect the entry mode decision. External uncertainty is related to a firm's environment and is typically labelled "country risk" (e.g., political instability, economic fluctua-

4 As usual, this paper assumes that the concepts of control and internalisation/integration are closely related (Andersen 1997).

5 Technically sophisticated products also impede monitoring of foreign distributors and agents. In this case, accurate measures of distributors' performance might not be available. Thus, we have a classic principle-agent situation, where problems like adverse selection and/or moral hazard might occur (see, e.g., Zacharakis 1997).

tions). Anderson and Gatignon argued that in the absence of transaction-specific assets, a low-control entry mode is appropriate. The domestic firms are able to retain flexibility and shift country risk to their foreign partners, since the latter can easily be replaced if the outcome is unsatisfactory. If, however, transaction-specific assets, as described above, are prevalent, switching between different foreign partners is expensive, making a partner nearly irreplaceable. These difficulties in selling a technically sophisticated product abroad are intensified in an uncertain environment. Thus, Anderson and Gatignon hypothesised that the *combination* of transaction-specific assets and external uncertainty leads to a higher degree of control. Internal uncertainty describes the lack of experience in international business activities firm managers might perceive. Moreover, internal uncertainty is higher, the greater the sociocultural distance is between its domestic market and the foreign market entered by the firm. A low-control entry mode, for instance an intermediary, will be preferred if internal uncertainty prevails.[6]

The main limitation of the TCA theory is that, in reality, firms do not evaluate the benefits of internalisation on the reduction of transaction costs alone. Other considerations like the desired market penetration in a foreign market might be relevant as well. If these motives are taken into account firms will arrive at different entry mode choices (Andersen 1997, Madhok 1997).

The eclectic paradigm developed by Dunning (1993) is a multitheoretical framework that combines elements of all the theoretical approaches reviewed above. Dunning argued that the success of firms' international business activities depends on three factors: ownership advantages like firm-specific assets (O), locational advantages that describe the attractiveness of a foreign country (L), and internalisation advantages that reflect a firm's ability to conduct a transaction within its hierarchical organisation efficiently (I). Dunning's eclectic paradigm is therefore also called the OLI framework. It predicts that a firm will choose the sales mode most suited to the "advantages" it possesses. The main improvement of the eclectic paradigm in comparison with other theories is that it includes a large set of explanatory variables and, most importantly, that it points out how different influencing factors interact. For example, a firm that generates an intangible asset by carrying out intense research and development (R&D) activities so that its product incorporates novel technology (the firm's ownership advantage) only chooses an integrated sales mode if it is

[6] Anderson and Gatignon (1986) further propose that a high-control entry mode will be more efficient the higher the intermediary's free-riding potential. If the domestic firm possesses a high-value brand name, the foreign partner can "free ride" on the international recognition of the domestic firm, realising a high turnover without making its own sales efforts. Therefore, the domestic firm might prefer a high level of control in order to shield their brand name from degradation by free-riders. However, the domestic, i.e., German and UK-based firms in this paper's sample are young and small (see section 3). They do not (yet) possess an internationally recognised brand name. Quite the opposite, if the firms of our sample decide on an intermediary for entering a foreign market they might be interested in profiting from the recognition of the chosen distributor in that market.

also able to organise the distribution of its product abroad efficiently (the firm's internalisation advantage). However, the large set of explanatory variables is also the eclectic paradigm's greatest weakness. If all variables imaginable are included in a theory it is difficult to derive testable hypotheses (Andersen 1997). Itaki (1991) claimed that a detailed eclectic paradigm becomes virtually tautological. According to Dunning (1993) himself, the eclectic paradigm intends to explain "what is" rather than, in the normative sense, "what should be" a firm's type of internationalisation.[7]

The theoretical models reviewed are complementary rather than substitutable. They contain partly the same explanatory variables, although the argumentation as to how these variables affect the firms' entry mode choice differs. It is thus not surprising that all the theories reviewed found empirical support. The key results of several empirical studies are summarised in Table 1. The validity of a theory depends, among other things, on the sector and size of the firms that have been examined. I will refrain from discussing and comparing these studies in detail. The interested reader is referred to the research papers listed and the literature cited therein. Due to the complementary character of the theories, the entry mode selection of a particular firm sample can often be explained by more than one model. Therefore, hypotheses for this paper's empirical analysis will be derived from the four models discussed and tests will be conducted to determine which theories can best explain the sales mode changes of our sample's technology-oriented firms.

Most theoretical and empirical research on entry mode choice is concentrated in manufacturing firms. Services, however, differ from manufactured goods. They tend to be personnel-intensive, inseparable (production and consumption are geographically and temporally linked), and perishable (services cannot be stored). Theories that were developed to explain the entry mode choice of manufacturing firms are therefore not necessarily also applicable to service firms. Brouthers et al. (1996) analysed theoretically and empirically whether Dunning's eclectic paradigm could explain the entry mode selection of small software firms in the United States. They confirmed that software firms with greater ownership and locational advantages are more likely to choose an integrated entry mode.[8] However, the authors stressed that software firms in their sample behave like larger manufacturing firms. Since software is produced in the domestic country and can be transferred as a disk or via the Internet, software is indeed separable and not perishable. Therefore, it is questionable whether these findings are transferable to other service sectors.

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[7] If, in the normative sense, the OLI framework gave advice to firm managers as to what they should do, selecting foreign entry mode based on the firm-specific OLI advantages should lead to better performance than that of firms that do not match their entry mode choice to their OLI advantages. Brouthers et al. (1999) found empirical support for the OLI framework as both a descriptive and a normative model.

[8] In their empirical analysis Brouthers et al. (1996) neglect internalisation advantages.

**Table 1: Empirical Studies on the Decision on Foreign Market Sales Modes**

| Internationalisation Process Model | Resource-Based View / Organisational Capabilities (OC) | Transaction-Cost Analysis (TCA) | Dunning's Eclectic Paradigm |
|---|---|---|---|
| *Barkema et al. (1996)*<br>225 FDIs of 13 large Dutch firms; firms learn from their previous experience when gradually expanding their international business activities. Learning effects are only relevant in the case of low-control FDIs (acquisitions or joint ventures).<br><br>*Delios and Henisz (2003)*<br>FDIs of Japanese manufacturing firms; firms with a high level of experiential knowledge are less sensitive to the effects of uncertain policy environments on investments.<br><br>*Sharma / Johanson (1987)*<br>Swedish technical consultancy firms; resource commitment is of minor significance for the internationalisation process.<br><br>*O'Farrell et al. (1995)*<br>Small and medium sized UK-based business service firms; the process model was rejected, the most common entry mechanism was responding to a particular ad hoc order. | *Madhok (1998)*<br>US and European multinational manufacturing firms; the OC perspective is most efficient in explaining firms' entry mode decision. Firms may often need to trade off transaction cost-related concerns against capability-related ones.<br><br>*Ekeledo / Sivakumar (2004)*<br>US manufacturing and non-separable service firms; the resource-based theory has good explanatory abilities for entry mode strategies of both manufacturing and non-separable service firms. However, the impact of firm-specific resources on entry mode choice differs sometimes between the two groups of firms.<br><br>*Bürgel and Murray (2000)*<br>Newly founded technology-oriented firms in the UK; the entry mode choice of high-tech start-ups can better be explained by an OC framework than by transaction-cost or stage theory. | *Hennart (1991)*<br>Japanese manufacturing firms investing in the US; high transaction costs on the US market increase the degree of ownership taken by Japanese firms in their US subsidiaries.<br><br>*Brouthers / Brouthers (2003)*<br>Manufacturing and service firms from Western Europe entering Central and Eastern European Markets; due to the investment-intensive nature of manufacturing, environmental uncertainties influence manufactures' mode choice; due to the personnel-intensive nature of services, behavioural uncertainties influence service providers' entry mode choice.<br><br>*Erramilli and Rao (1993)*<br>US service firms, including software, banking, engineering firms, and hotels and restaurants; service firms choose their entry mode according to a modified TCA model that considers inseparability or capital intensity if relevant. A low-control entry mode is selected if the cost of integration rises and the firm's ability to integrate is limited. | *Tse et al. (1997)*<br>Multinational firms investing in China; locational advantages affect the probability of choosing an equity-based entry mode and whether a firm will enter with a partner or not.<br><br>*Brouthers et al. (1999)*<br>German and Dutch firms entering into Central and Eastern Europe; firms that possess high OLI advantages tend to prefer more integrated entry modes.<br><br>*Nakos / Brouthers (2002)*<br>Small and medium sized Greek firms entering into Central and Eastern Europe; OLI advantages explain 85 % of mode choices.<br><br>*Brouthers et al. (1996)*<br>US software firms; the probability of an integrated sales mode increases with a firm's ownership and/or locational advantages. |

Source: own presentation.

Erramilli and Rao (1993) modified the TCA theory approach in order to consider the peculiar characteristics of service firms. They hypothesised that inseparability causes additional costs and risks that have to be borne either by the firms themselves (an integrated entry mode) or by the chosen foreign partner (a non-integrated mode). According to Erramilli and Rao, a firm chooses a higher degree of integration the higher the transaction-cost specificity of the firm's service is (e.g., a technically sophisticated service). Brouthers and Brouthers (2003) pointed out, however, that in

the case of (external and internal) uncertainty, internal organisational costs might be very high and could exceed the cost savings of an integrated entry mode.

The resource-based view of a firm and the internationalisation process model were both not developed to account for the entry mode choice of service firms. However, whereas the notion of the RBV and Madhok's OC framework are also appropriate to explain foreign sales modes of service firms, the internationalisation process model is less valid in service industries, especially in technology-oriented sectors. Bell (1995) claimed that there is only little empirical support for the view that software firms increase their engagement in one particular foreign market in small incremental steps. The growing commitment to exporting is expressed by an expansion into new destination countries rather than by an increasingly resource-intensive sales mode in one market. Sharma and Johanson (1987) demonstrated for a sample of Swedish technical consultancy firms that the latter bypass some of the incremental steps proposed by the stage models since "resource commitments are of minor significance" for them (Sharma and Johanson 1987, p. 28). Of course, there are services for which an international engagement might entail large-scale investments (e.g., hotels or hospitals). For software and consultancy firms, however, comparatively cheap sales modes are available (e.g., transferring a digital document via the Internet), allowing firms to expand their engagement in a foreign market without a large-scale commitment of physical resources.

The stage models describe a time-dependent sequence of sales modes where firms start with no regular exports and move step by step to more resource-intensive sales modes. The other theories reviewed above do not explicitly deal with sales mode changes. However, the models' explanatory variables (e.g., a firm's intangible assets, transaction costs) might fluctuate over time and it might be optimal for a firm to change its sales mode and adjust it to changing conditions (Calof and Beamish 1995). Replacing the sales mode currently used is, however, not without costs. A firm has to consider the costs of switching. Moreover, choosing a sales channel requires an investment, e.g., a marketing campaign if an integrated sales mode is selected, or an investment in finding a distributor in the case of a non-integrated sales mode. Such investments might be regarded as sunk costs. Considering further that selecting an appropriate sales mode is a decision made under uncertainty, this induces an option value of waiting: Even if the currently used sales mode is not optimal according to a cost-benefit analysis, it might be best to retain the present sales mode in order to avoid (sunk) costs of switching back in the foreseeable future. This leads to a spell of inaction similar to the model of export market participation as developed by Roberts and Tybout (1997).[9] Thus, we expect to observe a relatively high persistence over time in the selected sales modes.

[9] This phenomenon is known as "hysteresis" (Dixit 1989).

## 3 Data and Descriptive Analysis

This paper's empirical analysis examines changes of international sales mode of technology-based firms in Germany and the UK. Technology-oriented firms are identified using the definition of high-technology manufacturing sectors in the UK established by Butchart (1987). He provided a definition based firstly on the ratio of R&D expenditures to sales and secondly on the share of employees working in R&D. Using this definition, Butchart identified nineteen UK 1987 SIC codes, which were translated into the NACE Rev. 1 code and are listed in detail in Table 7 of this paper's appendix. Table 7 defines four aggregated manufacturing sectors and augments Butchart's list with a number of selected service sectors (cf. Bürgel et al. 2004).

The data for this paper's empirical analysis result from two surveys simultaneously carried out in Germany and the UK. The source data set originates from Dun & Bradstreet in the UK and Creditreform[10] in Germany. Using these databases, all firms with at least three employees in 1997 that were operating in one or more high-tech sectors as defined by Butchart (1987) and having been founded as legally independent companies[11] between 1987 and 1996 were selected. This resulted in a population of 3,562 firms from the UK and 5,045 from Germany. The sample composition of the 1997 population is given in Table 8 in the appendix. A random sample of 2,000 firms was drawn from each country's population, stratified by size class, sector (manufacturing versus services), and, for Germany, by region (Western and Eastern Germany).

The firms were first contacted in winter 1997/1998 via a written questionnaire. The first survey was carried out by the London Business School in the UK and the Centre for European Economic Research (ZEW) in Germany. The written questionnaire contained questions regarding the profile of the firms' founder(s), product characteristics, international business activities, entry modes into foreign markets, and perceived opportunities and risks of international activities. 362 completed questionnaires were returned from the UK along with 232 questionnaires from Germany, resulting in a combined net sample of nearly 600 NTBFs from the two countries. The net sample showed no bias with respect to age, size, or sector when compared with the random sample. A bias with respect to internationalisation behaviour could, however, not be ruled out.[12]

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[10] As Germany's largest credit rating agency, Creditreform has the most comprehensive database of German firms at its disposal. Creditreform provides data on German firms to the Centre for European Economic Research (ZEW) for research purposes.

[11] Subsidiaries, de-mergers, or firms that were founded as a management buy-out (MBO) or buy-in (MBI) were excluded from the analysis.

[12] The first survey is described in detail in Bürgel et al. (2004). This report also includes numerous descriptive and econometric analyses of this unique data set.

In order to determine development and status of internationalisation of this sample of 600 NTBFs, a joint research team from the University of Exeter and the ZEW prepared a new survey in which all the firms that had previously responded were to be contacted a second time. In 2003, the companies from the original sample were an average of 12 years old. Thus, some of them were no longer definable as new technology-based firms.[13] Considering this notion, we shifted our interest from analysing newly founded firms to a more longitudinal perspective of firm development. To determine the target sample of the second survey, all former respondents that turned out to be mismatches (e.g., non-high-tech firms, non-independent foundations) were first excluded. We then eliminated each German firm labelled in the database of Creditreform as "dead" (due to bankruptcy as well as voluntary firm closure) at the beginning of 2003.[14] In the UK, firms that could be identified as dead by the researchers themselves were also excluded from the target sample.[15] As a result, we produced and subsequently contacted a final target sample of 188 German and 250 UK-based firms that had responded to the first survey.

The second survey was conducted in 2003 via computer-aided telephone interviews (CATI). The research team decided on a telephone survey because, due to the limited number of former respondents that made up the target sample, the assurance of a relatively high response rate and thereby a sufficiently high number of observations was necessary to obtaining reliable econometric results. Fortunately, in both the UK and Germany, the response rate exceeded 50 %, giving us a pool of 244 completed interviews. After performing several consistency checks, 217 companies were retained in the data set for econometric analyses.

On average, 26 employees worked in the sampled firms in 2003. Applying a t-test proves that the number of employees of exporting firms significantly exceeds the number of employees of firms with only domestic sales both in Germany and the UK. Investment in R&D is of major concern to technology-oriented firms. In 2003, the firms in our sample spent on average 12.8 % of their total sales on R&D. Similarly to firm size, the mean R&D intensity of firms with international sales is significantly higher compared with the mean of non-exporting firms. Interestingly, this significant difference between exporters and non-exporters with respect to their R&D activities can only be

[13] In his influential study, Little (1977) used a definition of NTBFs which includes firms as old as 25 years. In contrast, the first survey on which this paper is based considered only firms that were ten years of age or younger in 1997, which is in line with more recent studies of NTBFs (see, e.g., Storey and Tether 1996).

[14] According to the analysis of Prantl (2002), those firms indicated as "dead" by Creditreform have almost certainly left the market. The reverse, however, is not true: there is often a considerable delay in Creditreform recording voluntary firm closures, causing the number of closed firms to be underestimated.

[15] Table 8 in the appendix also shows the number of still-living firms in 2003. Since the number of mismatches in the population is indeterminable, possible mismatches are not considered in Table 8.

observed based on the data of the second survey in 2003. Comparing R&D activities in 1997, i.e., at the time of the first survey, no significant difference in the mean R&D intensity could be found. Both exporters and non-exporters spent about 15 % of total sales on R&D. Obviously, during the period between the two surveys, R&D activities became a distinctive characteristic by which an internationally oriented firm discriminates from its domestic oriented competitors.

**Table 2: Firms with International Sales by High-Tech Sectors (in %)**

| | Germany | | | | UK | | | |
|---|---|---|---|---|---|---|---|---|
| | 1997 | | 2003 | | 1997 | | 2003 | |
| **Sector** | No | Yes | No | Yes | No | Yes | No | Yes |
| Software/services | 50.0 | 50.0 | 45.5 | 54.5 | 40.6 | 59.4 | 35.5 | 64.5 |
| ICT-hardware | 20.0 | 80.0 | 20.0 | 80.0 | 0.0 | 100 | 0.0 | 100 |
| Engineering | 15.8 | 84.2 | 10.5 | 89.5 | 20.0 | 80.0 | 13.8 | 86.2 |
| Health/life sciences | 20.0 | 80.0 | 20.0 | 80.0 | 0.0 | 100 | 0.0 | 100 |
| Other high-tech manuf. | 27.3 | 72.7 | 27.3 | 72.7 | 25.7 | 74.3 | 31.4 | 68.6 |
| Total | 31.6 | 68.4 | 28.7 | 71.3 | 23.5 | 76.5 | 22.2 | 77.8 |

Source: ZEW, University of Exeter, own calculations.

Table 2 shows the share of firms with and without international sales, in 1997 and 2003 respectively, considering only those firms that participated in both surveys. In both countries, more than two-thirds of the respondent firms had international sales. Even in the service sector, the majority of firms (mainly software firms) turned out to have exports, although the percentage of firms with foreign sales is smaller than in any aggregated high-tech manufacturing sector. In the manufacturing industry, firms that belong to the sectors ICT-hardware, engineering, and health/life sciences export more often than other manufacturing firms. In the UK-based sample, all firms in the sectors ICT-hardware and health/life sciences had international business activities. However, it should be mentioned that the number of observations in these two sectors is rather small. In Germany, only 5 ICT-hardware firms (15 firms in health/life sciences) answered both surveys; in the UK, 12 ICT-hardware firms (10 in health/life sciences) participated in both surveys.[16]

There was a slight increase in international engagement between 1997 and 2003. The overall share of exporting firms increased from 72 % in 1997 to 74 % in 2003. With the exception of other manufacturing firms in the UK, in all sectors the share of firms with exports in 2003 was at least as

[16] In fact, in contrast to the first survey where no sector bias was found, the ICT-hardware sector is underrepresented in the German as well as in the UK-based sample. Conversely, the health/life sciences sector (engineering sector) is overrepresented in the German (UK-based) sample.

high as in 1997. Although there is a high persistence in the individual status of internationalisation[17], quite a high number of firms changed their internationalisation status, leading to entry and exit over time. Nearly 12 % of German and 8 % of UK-based firms left the foreign market between 1997 and 2003. During the same period, 14 % of German firms and 8 % of firms sited in the UK entered the international market. Thus, German high-tech firms more frequently change their internationalisation status, whereas UK firms show a higher persistence in their export behaviour.

The number of foreign countries to which internationally active firms sold their products and services also increased between 1997 and 2003. At the time of the first survey, UK-based exporters had sales in an average of just over 9 foreign countries, whereas German firms supplied 7 foreign countries on average. These numbers rose up until the second survey in 2003 to 19 foreign destinations for UK firms and just under 12 foreign countries for German firms. Similarly, both UK-based and German exporters were able to enlarge the share of foreign sales in their total sales: The average share of total turnover of UK (German) exporters generated by foreign sales rose from 39 % (24 %) in 1997 to 50 % (33 %) in 2003. Obviously, the degree of internationalisation, measured by the number of foreign countries entered as well as the share of foreign sales, was higher for UK-based exporters than for their German counterparts.[18] As Bürgel et al. (2004) argued, this might be the case because British exporters are pro-actively in exploiting the sales potential of foreign markets or because German firms are less dependent on the international market because of the larger size of their domestic market.

There are also differences between German and UK firms with respect to the geographical focus of their first international market. The five most frequently stated countries where German firms had their first foreign sales were, in order of frequency, Austria, Switzerland, the Netherlands, the United States, and Belgium. Thus, German firms preferred neighbouring countries as their initial target countries, although the US market still occupied the fourth place for German firms. On the contrary, UK-based exporters most frequently indicated Germany, the United States, France, the Republic of Ireland, and the Netherlands. British technology-oriented start-ups obviously favoured countries with a large market potential. The nearest neighbour of the UK, the Republic of Ireland,

[17] Roberts and Tybout (1997) develop a dynamic model with sunk costs that can explain the observed high persistence in firms' export behaviour. The authors can also empirically prove the existence of sunk costs for a sample of Colombian plants of the manufacturing sector, observed between 1981 and 1989 inclusively. For the sample used in the present paper, I analysed entry in and exit from the foreign market (see Fryges 2004a). Although the data set is not suitable to prove empirically the existence of sunk costs, my results are consistent with the sunk costs hypothesis.

[18] According to t-tests, the means for UK firms are significantly larger than the means for German firms. This is true for both measures and for both points in time.

only took the fourth place among the most popular initial markets. The differences between German and UK firms might again be due to the more pro-active behaviour of UK firms (see Bürgel et al. 2004). The latter firms operated a "push-strategy" (Andersson 2000), i.e., from their first export activities they actively created the internationalisation process of their firm and exploited the sales potential of the foreign market. In contrast, the first foreign sales of German firms were often a result of an unsolicited order from abroad ("pull-strategy", Andersson 2000). This interpretation is supported by the fact that UK firms more often chose distant, non-European markets as their first target market (in addition to the United States, e.g., Canada, South Africa, or Japan).[19]

Beside their first target countries, the two surveys this paper is based on asked the sample's exporters to indicate the three most important countries (in terms of their contribution to total sales) where they had international sales. Aggregating these countries shows that countries from the European Union (15 member states, plus Switzerland, Norway, and Iceland [EU 15]) represented the main regional group for both German and UK-based firms (see Table 3).[20] Countries from the EU 15 were even more important for German than for UK firms. As in the case of the firms' first target country, more distant markets were of greater importance for UK firms than for their German counterparts. This is partly due to the more prominent role of English-speaking countries from the British Commonwealth (Australia, South Africa, Canada).

**Table 3: Geographical Focus of the Three Most Important Target Countries**

| | Germany | | UK | |
|---|---|---|---|---|
| | 1997 | 2003 | 1997 | 2003 |
| EU 15 (incl. Norway, Switzerland, and Iceland) | 67.63 | 70.27 | 54.07 | 48.37 |
| Rest of Europe | 10.79 | 7.03 | 4.78 | 3.25 |
| NAFTA (USA, Canada, Mexico) | 9.35 | 9.19 | 16.75 | 21.14 |
| Latin America (without Mexico) | 2.16 | 0.54 | 0.48 | 1.63 |
| Asia | 8.63 | 11.89 | 12.92 | 17.48 |
| Australia | 0.72 | 0.54 | 6.70 | 5.69 |
| Africa | 0.72 | 0.54 | 4.31 | 2.44 |
| Total | 100 | 100 | 100 | 100 |

Source: ZEW, University of Exeter, own calculation.

[19] In connection with the first survey conducted in 1997, 40 case studies (20 in each country) were carried out in order to illustrate the statistical findings of the large mail survey. The interviews, which are documented in detail by Bürgel et al. (2004), also support the interpretation that the internationalisation process of German firms can be described as a "pull-strategy", whereas UK firms rather follow a "push-strategy".

[20] Note that the unit of analysis for these figures is not the individual firm but the single country entered by the firm. Exporters that only have international sales in one country, enter the figures in Table 3 once, exporters that indicated three most important foreign markets contribute three observations to the figures.

Comparing the regional distribution of each nation's three most important countries in 1997 and 2003, a similar pattern emerges between the two points in time. However, whereas the role of countries from the EU 15 had increased for German firms, the share of EU 15 member countries among the three most important destinations had fallen for UK firms. Moreover, for German firms Asian markets became more prominent and, somewhat surprisingly, the role of Eastern European markets decreased in return. For UK firms, the share of both North American and Asian markets increased. The United States presented the single most important foreign destination for UK firms both in 1997 and 2003. On the contrary, the most important country for German firms in 1997 was Austria. In 2003, this place was occupied by Switzerland.

Referring to the three most important target countries, the first survey asked the firms' representatives to indicate the sales modes used to sell to these three countries at the time of market entry and in 1997. The second survey also referred to the three most important markets the companies had identified in 1997. Firms were first asked whether they still had foreign sales in each of these three countries. If this was the case, firms had to indicate the dominant sales channel they were currently using in each respective market in 2003. Thus, we arrived at a sequence of three sales modes in each of the firms' most important foreign markets of 1997. Such a sequence is required since we are interested in explaining *changes* in foreign sales modes. Of course, the markets investigated may no longer represent the firms' most important markets of 2003. In fact, a good one third of the foreign markets analysed lost this property between the two surveys.[21]

**Table 4: Sales Modes Used in Most Important Foreign Markets of 1997 (in %)**

| | Germany | | | UK | | |
|---|---|---|---|---|---|---|
| Sales Mode | entry mode | 1997 | 2003 | entry mode | 1997 | 2003 |
| Direct exporting | 42.31 | 35.77 | 47.31 | 37.81 | 30.57 | 35.71 |
| Agents | 11.54 | 12.20 | 5.38 | 10.95 | 9.84 | 13.49 |
| Distributors | 40.00 | 44.72 | 38.71 | 45.27 | 49.74 | 45.24 |
| Sales joint venture | 0.77 | 0.81 | 1.08 | 2.49 | 4.66 | 1.59 |
| Wholly-owned subsidiary | 0.77 | 2.44 | 3.23 | 1.49 | 3.11 | 3.97 |
| Licensing | 4.62 | 4.07 | 4.30 | 1.99 | 2.07 | 0.00 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

Source: ZEW, University of Exeter, own calculation.

[21] The second survey provides information on the sales modes in each country's three most important markets of 2003, as they were summarised in Table 3. The distribution of sales modes used in these markets is similar to that shown in Table 4, although direct exporting is even more prominent for both German and UK-based firms.

German firms most frequently used direct exporting to end-users as their entry mode in foreign markets (see Table 4). In contrast, foreign distributors that sell on a regular basis were the preferred entry mode for UK exporters. The more prominent role of direct exporting among German firms might reflect that they more often started exporting due to an unsolicited order from abroad before they had made any contractual agreement with a foreign distributor (pull-strategy). In contrast, UK exporters, who tended to pro-actively exploit the foreign market, more often began their international business activities based on a contractual agreement with a foreign partner (push-strategy). UK firms' relative preference for using an intermediary probably also reflects that UK firms' three most important foreign markets were relatively often remote, non-European countries, where a co-operation with a foreign partner might be particularly advantageous. Besides foreign distributors, foreign agents that sell ad hoc on a commission basis might also act as this kind of foreign partner. In a good 10 % of the most important foreign markets, both German and UK firms used foreign agents as their first entry mode. The literature on entry modes generally does not distinguish between agents and distributors: Both export intermediaries are assumed to possess local-market knowledge and crucial contacts with foreign customers. Moreover, finding good distributors or agents demands considerable efforts (see, e.g., Root 1987). Although it might be argued that firms have to choose efficiently between agents and distributors and that their choice might be affected by transaction-specific assets and production-cost economies (Bello and Lohtia 1995), this paper follows most other studies and regards the two export intermediaries as one sales mode.[22]

Sales joint ventures and wholly owned sales subsidiaries were rarely chosen as the entry mode. These two entry modes constitute more resource-intensive modes than direct exporting or export intermediaries. Most of our sample's exporters probably did not possess enough resources to enter the foreign market via a sales subsidiary. This is true not only for the firms' entry mode but also for the sales mode used in 1997 and 2003. Although a slight increase in the share of markets that were entered via a sales subsidiary could be observed, these resource-intensive entry modes continued to be of minor importance. Therefore, they are neglected in the subsequent analyses.

Licensing as a foreign market entry mode is commonly defined as a contractual agreement where the domestic firm (licensor) provides a foreign company (licensee) with intangible assets or property rights in return for payment (Root 1987, p. 85). In general, licensing is discussed in the context of foreign production of manufacturing firms as opposed to foreign direct investment (FDI).

[22] Adding up the percentages of agents and distributors reveals that for German exporters, as for their British counterparts, export intermediaries comprise the most frequently used first entry mode. However, direct exporting remains more prominent among German firms than among UK firms.

This sales mode, however, is almost irrelevant for our sample. Only one manufacturing firm indicated licensing as its sales mode. The firms that pointed out licensing as displayed in Table 4 were software firms that sold licenses for the use of their software programmes to foreign companies and end-users. In the following, licensing will be neglected as well, since the firms in our sample likewise rarely chose it as their dominant sales mode in a foreign market.

In 1997, exporting via an intermediary (agents and distributors) was used in more than 50 % of the firms' most important foreign markets as the dominant sales mode. In comparison, the share of foreign countries that were serviced via direct exporting decreased for both German and UK firms. Some firms that had first entered a foreign market with direct exports changed their sales mode to exports via an intermediary before 1997.[23] If the initial stimulus of starting an international engagement on a foreign market was an unsolicited order, firms might have first supplied their new foreign customer on that market by a direct export. Later, firms might have raised their commitment on that market by making a contractual agreement with a foreign distributor or agent. Thus, changing from direct exports to an intermediary can be regarded as an increased commitment of resources as predicted by the internationalisation process model (Johanson and Vahlne 1977, 1990). However, exporting via an intermediary is not necessarily more resource-intensive than direct exporting. If direct exporting means selling standardised products or pre-packaged software via the Internet (business-to-business or business-to-consumers e-commerce) transaction costs will fall below that of selling via a foreign distributor or agent (e.g., costs for finding and controlling the foreign intermediary). Indeed, the share of firms that used direct exporting is significantly higher for our sample's software firms than for manufacturing firms. If, however, the firm sells a product that requires close contact to end-users (because of individual client customisation, for instance), direct exporting will turn out to be highly resource-intensive. In this case, transaction costs could well be reduced by a foreign intermediary.[24] Thus, it depends on a firm's product characteristics whether exporting via an intermediary comprises a more resource-intensive sales mode than direct exporting or vice versa. Similarly, a change of sales mode from direct exporting

[23] The number of observations in the two columns "entry mode" and "sales mode in 1997" are almost identical since the information for both was given in the first survey conducted in 1997. The minor deviation in the number of observations is only due to some item non-responses. Changes in the share of entry modes in the two columns, therefore, result from firms changing their sales mode in one market or another.

[24] Note that this argumentation contradicts the propositions of Anderson and Gatignon (1986) as reviewed in section 2. They assumed that transaction costs of selling a technically sophisticated product via an intermediary (low-control sales mode) exceed those of direct exporting (high-control entry mode), in particular because of high costs of controlling a potential intermediary. In contrast, I argue that in the presence of transaction-specific assets the costs of controlling a foreign distributor rise as proposed by Anderson and Gatignon, but that the costs of direct exporting also increase tremendously. Thus, the costs of exporting via an intermediary may or may not exceed the costs of direct exporting.

to an intermediary may or may not mean a more resource-intensive commitment to the foreign market. However, young and small technology-oriented firms might still be forced to use a foreign partner in order to overcome what Bürgel et al. (2004) called the "liability of alienness". Customers might not trust an unknown foreign supplier which is not even established in its own domestic market. Thus, using an intermediary might be the only way for a young high-tech firm to sell on a foreign market.

Taking this into account, it is rather surprising that between 1997 and 2003 some firms changed their dominant sales mode from using an intermediary to direct exporting.[25] German firms in particular increased the share of foreign markets where they used direct exports so that in 2003 this sales mode was more prevalent than exporting via an intermediary. The share of foreign markets where UK firms sold their products via direct exporting also rose between the two surveys, although intermediaries retained their most frequently used sales mode. The resurgence in the importance of direct exporting might have several causes. Generally speaking, firms decide on a change of their sales mode based on a cost-benefit analysis. Thus, they will change to direct exporting if they can reach a given benefit (e.g., a desired foreign market penetration) with lower (transaction) costs, or if direct exporting results in a higher benefit at given costs.[26]

The cost-benefit trade-off might have altered between 1997 and 2003 because firstly, the sample's exporters might have become established suppliers on their foreign markets, reducing the liability of alienness and thus the necessity of using an intermediary. Secondly, the investigated market might no longer belong to the firm's most important markets in 2003. Assuming that exporting via an intermediary is the more resource-intensive sales mode, a small firm might have reallocated its limited resources to its current most important markets in order to build up new relationships with local distributors or agents. On the remaining, currently less important markets an exporter might restrict itself to serving its occasional customers by direct exports. Furthermore, an exporter might have increased the innovativeness of its products. According to the theories summarised in section 2, a higher degree of innovativeness should raise the firms' inclination to use a sales mode with a higher level of control, i.e. in our case, direct exports. Finally, firms might also have changed to

[25] The number of observations in the column "sales mode in 2003" is smaller than in the first two columns of Table 4. German firms left a good 18 % of their three most important markets of 1997 between the two surveys, UK firms left just under 10 %. Thus, the shares of sales modes used in 2003 differ from the 1997 column because firms left certain markets and because they changed the sales mode used on the foreign markets where they still had international sales in 2003.

[26] During the time period we observe, the majority of the firms in our sample switched their sales mode just once. There are a few markets where the sales mode was changed twice. Whenever this was the case, the sales mode first changed from direct exporting at the time of market entry to exporting via an intermediary in 1997, and then back to direct exporting in 2003.

direct exporting because the (relative) transaction costs of this sales mode decreased between 1997 and 2003. For example, electronic commerce (e-commerce), by which the costs of cross-border transactions can be reduced, became more and more widespread in both Germany and the UK.[27] [28] If direct exporting became relatively cheaper than exporting via an intermediary, this should make a change more likely.

**Table 5: Changes of Sales Modes in Firms' Most Important Foreign Markets of 1997**

| Sales modes *t*-1 | *n*<br>% | Sales modes *t*<br>Direct exporting | Intermediary | Other sales modes | Total |
|---|---|---|---|---|---|
| Direct exporting | | 146<br>81.11 | 28<br>15.56 | 6<br>3.33 | 180<br>100 |
| Exporting via an intermediary | | 30<br>9.74 | 266<br>86.36 | 12<br>3.90 | 308<br>100 |
| Other sales modes | | 8<br>22.86 | 4<br>11.43 | 23<br>65.71 | 35<br>100 |
| Total | | 184<br>35.18 | 298<br>56.98 | 41<br>7.84 | 523<br>100 |

Other sales modes: sales joint venture, wholly owned subsidiary, licensing.

Source: ZEW, University of Exeter, own calculation.

Table 5 shows in how many markets firms chose a particular sales mode, given the sales mode they had used in the previous period. Although switching is relevant, we observe a high persistence in the sales mode utilised. In more than 80 % of the firms' export destinations, the selected sales mode remained the same in the following period (observations on the main diagonal). This might be explained by the existence of sunk costs (e.g., the costs of finding a good intermediary). In just under 16 % of foreign markets where direct exporting was used as the dominant sales mode in the previous period, firms changed to exporting via an intermediary in the following period. As described above, this transition (not exclusively but) primarily occurred in the period between the

[27] There are only a few reliable and internationally comparable figures for the application of e-commerce. OECD (2003) uses the number of SSL-servers (secure socket layer) as an indicator for the potential of e-commerce, because SSL-servers are needed for business transactions via the Internet that require the transmission of confidential data, in particular in the case of electronic payment. The number of SSL-servers per 100,000 inhabitants increased remarkably during the last years: Whereas in 1998 there were 0.6 (1.2) SSL-servers per 100,000 inhabitants in Germany (in the UK), the number rose to 9.7 (17.2) in 2002. According to a ZEW survey, 39 % of all German companies with at least 5 employees utilised the Internet for e-commerce activities in 2002 (Hempell 2004).

[28] Fritz (2000) analysed how international market entry strategies will change if the possibilities of the Internet economy are taken into account.

foreign market entry and the 1997 survey. A transition from exporting via an intermediary to direct exporting was observed in just under 10 % of export destinations that were supplied via an intermediary in the previous period. Such a transition took place primarily in the period between the two surveys 1997 and 2003. Changes from and to other sales modes were numerically unimportant and will therefore be neglected. The econometric analysis thus concentrates on the upper-left four-field-transition matrix in order find out what factors influence the probabilities of a transition from direct exporting to exporting via an intermediary and vice versa.

## 4 Econometric Implementation

Examining the probability of a transition from one sales mode to another or remaining in the same sales mode in the next period, I apply a model inspired by Gouriéroux (2000) and used by Van et al. (2004) in order to estimate the transitions between different states of firm performance. The econometric model was also applied by myself (Fryges 2004a) in estimating foreign market entry and exit for this paper's sample, i.e., the transition probability between different states of export market participation. Since our sample's exporters were asked to indicate the sales mode used in their three most important foreign markets of 1997, the individual observation *i* is not the exporter but the sales mode used by the exporter in one particular foreign market.

Let $Y_{it}$ denote the sales mode *j* used in a particular market in time *t*, with $Y_{it} = 1$ if the exporter has chosen direct exports and $Y_{it} = 0$ otherwise. The transition probabilities are modelled with the logistic formulation and depend on a set of explanatory variables. The probability of transition from sales mode *j* in *t*-1 to sales mode *j´* at time *t* is then given by

$$(1) \qquad P_{ijj'}(t) \equiv P\left(Y_{it} = j' \middle| Y_{it-1} = j\right) = \frac{\exp\left(x_{it}\beta_{jj'}\right)}{\sum_{j'=0}^{1}\exp\left(x_{it}\beta_{jj'}\right)},$$

$i = 1, \ldots, N$, $t = 0, 1, 2$, and $j, j' = 0, 1$.

Imposing the identifying restrictions $\beta_{11} = 0$ and $\beta_{00} = 0$, we obtain

$$(2) \qquad P_{ijj}(t) = \frac{1}{1+\exp\left(x_{it}\beta_{jj'}\right)},$$

$$(3) \qquad P_{ijj'}(t) = \frac{\exp\left(x_{it}\beta_{jj'}\right)}{1+\exp\left(x_{it}\beta_{jj'}\right)},$$

with $j$, $j$' = 0, 1. Thus, a logit model is specified for each row of the transition matrix. Let us define $n_{i,t-1,t}(jj') = 1$ if sales mode $j$ was used in $t$-1 and sales mode $j$' at time $t$, and 0 otherwise. Then the log-likelihood conditional on the chosen sales mode at time $t$-1 is

$$(4) \qquad \ln L = \sum_{j=0}^{1}\sum_{j'=0}^{1} \ln L_{jj'}, \quad \text{with} \quad \ln L_{jj'} = \sum_{i=1}^{N}\sum_{t=1}^{2} n_{i,t-1,t}(jj') \ln P_{ijj'}(t).$$

Since the quantity $\sum_{j'=0}^{1} \ln L_{jj'}$ only depends on $\beta_{jj'}$, the maximum likelihood estimators $\hat{\beta}_{jj'}$ can be obtained by individually maximising the elements of $\sum_{j'=0}^{1} \ln L_{jj'}$, $j$ = 0, 1.[29] [30]

The vector of explanatory variables $x_{it}$ contains both firm-specific variables and those specific to the export market as derived from the theoretical models reviewed in section 2. As Johanson and Vahlne (1990) proposed, large firms are able to use a more resource-intensive sales mode, assuming that size is a proxy for firm-specific assets a company has at its disposal. Further, Johanson and Vahlne argued that uncertainty prevalent on a foreign market can be reduced by hiring an internationally experienced manager. The econometric model operationalises firm size as the logarithm of the number of employees at time $t$. In order to measure international experience, firms were asked whether a member of the firm's management team had work experience abroad, had previous work experience in the domestic country for an international company, or whether a manager was educated abroad before joining the company. The regression equation includes a dummy variable taking the value 1 if the firms' representatives indicated at least one of these kinds of international experience. According to Johanson and Vahlne, these two variables should be positively correlated with a change to a more resource-intensive sales mode. However, as discussed in section 3 it is not clear, a priori, whether direct exporting is more resource-intensive than exporting via an intermediary or vice versa. Thus, it is not possible to hypothesise which sign these two variables are expected to take based on the internationalisation process model.

According to the resource-based view, a firm distinguishes itself from its competitors by its intangible and inimitable assets. The international experience of firm managers can be regarded as constituting such an intangible asset. Additional assets of this sort are generated by conducting

[29] It is important to note that the dependent variable is the transition probability. Provided that there are no missing values for the independent variables, a particular foreign market will enter the log-likelihood function twice: with the transition probability from market entry to 1997 and with the transition from 1997 to 2003.

[30] Since the transition from a distributor to direct exports can be regarded as a rare event in our data set, I also estimated the respective transition probability using a rare event logit as proposed by King and Zeng (2001). The results, however, do not change so that in the following I will restrict myself on using a conventional logit model.

R&D activities and are reflected by the innovativeness of the firm's products and services. Instead of considering R&D intensity in the econometric model, I will include a dummy variable in the regression equation that indicates whether a firm carried out permanent R&D activities at the time of the surveys. This variable was gathered by the two surveys in addition to R&D intensity. It better describes the firms' long-term R&D activities and is therefore probably more suitable for explaining the probabilities of a sales mode change, since there is a six-year interval between the two surveys. Further, the innovativeness of the firm's best-selling product or service is approximated by a dummy variable taking the value 1 if, according to the representatives of the firm, the product or service incorporates a novel, self-developed technology. Both the organisational capability perspective and the transaction-cost theory propose that a high-control sales mode (e.g., direct exporting) will be selected if the firm possesses intangible, inimitable assets, or if the firm's product is technically sophisticated. Hence, the two variables are both hypothesised to lower the probability of switching from direct exporting to exporting via an intermediary, and to increase the probability of a change from using a foreign distributor or agent to direct exports.

Today's high-tech markets are characterised by shrinking product life cycles. The time span during which a high-tech firm can exploit its technological advantage is therefore limited (cf. Sampler 1998). Interviewing the firms in our sample, we asked firm representatives to estimate the time a competitor would need to launch either a similar product with superior performance or a product with similar performance at a lower price. Bürgel et al. (2004) called this competition-free time period when firms can realise temporary monopolistic rents the "window of opportunity". I will include a dummy variable in the estimation equation taking the value 1 if the estimated window of opportunity is one year or shorter. Malhotra et al. (2003) proposed that a short window should increase the probability of selecting a low-control sales mode in order to exploit the technology in the shortest time (see also Bürgel and Murray 2000). However, if a firm has to replace its product line at least once a year, the sales personnel of the foreign partner will have to be trained annually. Especially in the case of a technically sophisticated product where the transfer of knowledge to an intermediary is difficult, the costs of exporting via a distributor or agent will rise. It is questionable whether these costs can be amortised within a very short window. Therefore, I hypothesise that in the case of a short window of opportunity a firm is more likely to remain a direct exporter. Similarly, a firm is more likely to change to direct exports if it used an intermediary in the previous period. The econometric analyses will decide which of the two conflicting hypotheses – by Malhotra et al. (2003) and myself – better describes the sales mode selection of high-tech firms.

In addition to the technology incorporated in a firm's product or service, the transaction costs and thus the desired level of control might also be influenced by the necessity for close contacts to key

customers. According to Anderson and Gatignon (1986), a higher level of control will be preferred if intense product customisation is prevalent. The questionnaires used in both surveys measure the degree of customisation on a five point Likert scale ranging from 1 "unimportant" to 5 "very important". For the econometric estimations, a dummy variable will be used taking the value 1, if the firm has classified the requirements of customisation as "important" (4) or "very important" (5). If customisation is important, the probability of changing to an intermediary should decrease, whereas switching to direct exporting should be more likely. Moreover, the logit regressions contain a dummy variable that indicates whether the product or service is directly sold to end-users and a further dummy variable to indicate whether the firm sells business services to other companies. The base category is a firm selling manufactured goods to other companies (either as a component or as an investment good). Selling a product or service directly to a probably large number of end-users is personnel-intensive, but is often a matter of routine business that can easily be handled by an intermediary (e.g., a foreign retailer). In contrast, selling to other companies is often practised via personal contact to the other firm's purchasing department so that direct exporting will be preferred, in particular, if the exporter only has a limited number of key customers.[31]

According to the transaction-cost model of Anderson and Gatignon (1986), a lack of international experience leads to a low-control sales mode, i.e., to exporting via an intermediary. Our model measures the country-specific experience by the (logarithm of) the years a firm has conducted international business activities in the particular country since market entry.[32] Furthermore, the model includes the target country's market potential, approximated by (the logarithm of) the target country's GDP, and a ranking for country risk.[33] It is difficult to predict how sales mode selection is affected by target market size. On the one hand, for a firm to establish its own distribution network for direct exporting in a large country is more resource-intensive. On the other hand, a country with a large market potential is attractive and firms might invest in this country in order to

[31] Anderson and Gatignon (1986) further proposed that the probability of using a high-control sales mode will increase if the firm sells an immature product. I estimated a specification that included (the logarithm of) the age of the firm's best selling product, but this variable turned out to be insignificant in both transition equations and was therefore excluded from the final specification.

[32] Since we observe the firms of our sample only at the time of the two surveys, i.e., in 1997 and 2003, it cannot be excluded that a firm may have left and re-entered a particular foreign market between the two surveys. Thus, the number of years used in the regressions is, strictly speaking, only correct in the case of a continuous engagement in a foreign country.

[33] GDP is measured in US dollars at price levels and exchange rates of 2000. Data were taken from the OECD Statistical Database, available at http://www.oecd.org, for OECD member countries and from Global Economic Data of EconStats, available at http://www.econstats.com, for non-member countries of the OECD. Country risk data were obtained from the "Institutional Investor Magazine" (http://www.institutionalinvestor.com). These data were only available for 1998. Country risks were ranked and then entered into the model. Rank "1" was attributed to the lowest risk level.

pro-actively exploit that market. Therefore, I will follow Barkema and Vermeulen (1998) and Bürgel and Murray (2000) and include the size of target country as a control variable without formulating any hypothesis regarding the expected sign. Hence, the effect of market size, if any, will be determined econometrically.

Anderson and Gatignon (1986) further argued that country risk increases the probability of choosing a high-level of control sales mode only in *combination* with transaction-specific assets. Hence, I calculated two interaction variables by multiplying the country risk variable with the two dummy variables that represent the intangible assets incorporated in the firm's best-selling product or service. The first interaction term is the product of country risk and the dummy variable that indicates whether a firm permanently carried out R&D activities. The second interaction variable is the product of country risk and the dummy denoting that novel, self-developed technology is incorporated into the firm's product or service.

The sales mode used in a foreign market might also depend on the importance of that market, measured in terms of the country's contribution to total sales. If a firm generates only a relatively small share of total sales in a particular foreign country, e.g. due to some occasional orders from that country, the firm might not be willing to commit a high amount of resources to finding and training a foreign distributor or agent. In this case, occasional direct exports might be optimal. Conversely, in a target market that makes important contributions to the firm's total sales, a resource-intensive sales mode might be selected.[34] Unfortunately, the share of total sales generated by each target country is only available in the data set for the first survey and not for the second survey. In the second survey, firms were asked instead to indicate the percentage of total sales generated in the regions given by Table 3. Hence, I will use the share of total sales generated in the region the target country belongs to in order to approximate the importance of the particular market for the firm.[35]

Finally, I will include three dummies as control variables in the regression equations. The first dummy variable takes the value 1 if the exporter is sited in Germany. As the descriptive analysis in Table 4 shows, distributors and agents were more frequently used by UK-based firms in their three most important target countries. The descriptive analysis in section 3 further showed that service firms more often used direct exporting as their dominant sales mode than manufacturing firms.

[34] As already argued above, it is difficult to decide whether direct exporting or exporting via an intermediary is the more resource-intensive sales mode. Thus, it is not possible to hypothesise which sign is expected in the regression equations.

[35] Data from the first survey were appropriately aggregated in order to obtain comparable data for both periods examined.

Therefore, two industry dummy variables were added. The first industry dummy variable characterises firms that belong to an engineering industry. The second dummy variable indicates firms from other manufacturing sectors, including ICT-hardware and health and life sciences. Thus, service firms are used as the base category. More disaggregated industry dummies might be desirable, but the number of firms from the sectors ICT-hardware and health/life sciences is so small that I decided to consider only two industry dummy variables.

## 5 Empirical Results

The results of the empirical model are given in Table 6.[36] The second column shows the vector of coefficients $\hat{\beta}_{10}$, explaining the sales mode change from direct exporting at time *t*-1 to exporting via an intermediary at time *t*. The third column includes the vector $\hat{\beta}_{01}$ for a change in the opposite direction, i.e., from an intermediary to direct exports.

The country-specific dummy variable is insignificant in both transition equations. Thus the fact that UK-based firm more often changed to exporting via an intermediary when they had used direct exporting in the previous period can be explained by the remaining observable variables in the vector of coefficients. There is no additional country-specific effect.[37]

Manufacturing firms are more likely to change from direct exporting to exporting via an intermediary than service firms. Moreover, the probability that an engineering firm will keep on selling its products via a foreign distributor or agent if it had already used this sales mode in the previous period is higher than for other manufacturing and service firms. These results coincide with the findings of the descriptive analysis that service firms more often use direct exports as their dominant sales mode. For our sample's service firms (mainly software firms) direct exporting probably constitutes a relatively cheap sales mode since they can distribute their digital services directly via

[36] The results were obtained using the statistical software package STATA, version 8.2 SE. To analyse the results, I also used the STATA-based programme CLARIFY, written by Michael Tomz, Jason Wittenberg, and Gary King, and available at http://GKing.Harvard.Edu (cf. King et al. 2000).

[37] I also estimated the two transition equations for each country separately. Since the number of successes (i.e., a sales mode change) is relatively small, country-specific estimations involve some problems. For example, when estimating the probability of a transition from direct exports to exporting via an intermediary for UK firms the dummy variable indicating the international experience of management team perfectly predicts failure (i.e., no change) and must therefore be excluded from the regression equation. Moreover, due to the reduced number of observations in the country-specific regressions some variables are no longer significant. Nevertheless, the signs of the individual variables are the same in each country-specific regression and in the pooled regression. Furthermore, there are no variables that are significant in a country-specific regression and insignificant in the pooled regression. Thus there is no evidence of structural differences between German and UK-based firms.

**Table 6: Propensities of Sales Mode Changes – Results of Logit Models**

| | **Sales mode change direct exports → intermediary** | | | **Sales mode change intermediary → direct exports** | | |
|---|---|---|---|---|---|---|
| | Number of observations = 130<br>LL = -41.033<br>$\chi^2(17) = 29.71$<br>Prob > $\chi^2(17) = 0.029$<br>McFadden's $R^2 = 0.355$ | | | Number of observations = 242<br>LL = -46.699<br>$\chi^2(17) = 40.28$<br>Prob > $\chi^2(17) = 0.001$<br>McFadden's $R^2 = 0.419$ | | |
| | *Coeff.* | *Robust stand. error* | | *Coeff.* | *Robust stand. error* | |
| Country | -0.272 | 0.771 | | 0.907 | 0.698 | |
| Engineering | 4.000 | 1.492 | *** | -2.206 | 1.072 | ** |
| Other manufacturing industries | 3.238 | 1.316 | ** | -0.235 | 0.891 | |
| Log (number of employees) | 0.090 | 0.255 | | 1.043 | 0.426 | ** |
| International experience of management | 1.026 | 1.000 | | 2.354 | 1.315 | * |
| Permanent R&D activities | 0.857 | 0.813 | | -0.797 | 0.621 | |
| Interaction (country risk * perm. R&D) | -0.096 | 0.040 | ** | -0.023 | 0.043 | |
| Novel, self-developed technology | -0.232 | 1.426 | | 2.016 | 0.859 | ** |
| Interaction (country risk * novel tech.) | -0.006 | 0.064 | | -0.055 | 0.045 | |
| Window of opportunity ≤ 12 months | -2.175 | 0.793 | *** | 1.077 | 0.535 | ** |
| Intense product customisation | -1.171 | 0.593 | ** | 0.860 | 0.695 | |
| Consumer good | 2.212 | 0.730 | *** | -1.211 | 0.690 | * |
| Business service | 1.303 | 0.866 | | 3.272 | 0.977 | *** |
| Log (years since entry into target country) | 1.233 | 0.590 | ** | 3.802 | 1.120 | *** |
| Log (GDP of target country) | -0.043 | 0.310 | | -0.305 | 0.247 | |
| Rank of country risk 1998 | 0.053 | 0.049 | | 0.040 | 0.023 | |
| Share of total sales generated in the target country's region | -0.016 | 0.020 | | -0.008 | 0.041 | |
| Constant | -6.548 | 2.223 | *** | -14.565 | 4.412 | *** |

* 10 % level of significance; ** 5 % level of significance; *** 1 % level of significance.

Base category: entry of a UK-based software/service firm.

Source: own estimation.

the Internet. Surprisingly, engineering firms differ from other manufacturing firms in their lower probability of switching to direct exports. There are perhaps additional industry-specific costs that have to be borne by engineering firms, costs that are not captured by the variables of our model. If establishing business relations with a foreign intermediary is more expensive for an engineering firm than for other manufacturing firms, i.e., if the sunk costs an engineering firm has to pay exceed that of other firms, the engineering firm will more likely continue to sell its product via an intermediary. In the presence of sunk costs an engineering firm will keep on exporting via an intermediary in order to avoid (possible) costs of switching back, even if the use of an intermediary is currently not optimal.

Firm size, measured by the number of employees, does not affect the probability of a change from direct exports to exporting via an intermediary. Interpreting size as representing the firms' financial or physical resources, this is an interesting result. It corresponds to the findings of Bürgel et al. (2004) who estimated a probit model for the exporter's decision on an entry mode (the first sales mode used in a particular target country), using the cross-sectional data set of the first survey this paper is based on: The (logarithm of) start-up size has no effect on choosing a distributor as the first sales mode.[38] Thus, identifying and forming commercial relationships with a foreign partner requires so few additional resources that they can be raised even by the small, high-tech firms of our sample. On the contrary, replacing exporting via an intermediary by direct exports is facilitated if the firm has large financial or physical resources at its disposal. The coefficient of firm size is positive and significant in the transition equation. Finishing the co-operation with a foreign partner and establishing one's own distribution network for direct exporting can thus be interpreted as a more resource-intensive commitment to a particular market, at least for manufacturing firms.

The influence of the management's international experience goes in the same direction as that of firm size. While it does not have any effect on switching to exports via an intermediary, it supports a change to direct exports. If managers possess international experience they are less reliant on a foreign partner to sell their products. However, the managers' international experience does not prevent a firm from being forced to use an intermediary during an early stage of its international engagement: The probability that a firm that has entered the foreign market by direct exports changes to an intermediary is unaffected by the international experience of its managers, possibly because the firm has to overcome the liability of alienness.

Permanent R&D activities do not have any individual influence on the transition probabilities. There is only a slightly significant negative effect of the interaction term with the country risk variable. Moreover, the prevalence of novel and self-developed technology only raises the probability of switching from an intermediary to direct exports, having no effect on the transition in the other direction. The signs of the significant variables thus correspond to the predictions of the transaction-cost theory and the organisational capability perspective. Nevertheless, the transition probability from exporting directly to exports via an intermediary seems to be rather independent of the firm's intangible and inimitable assets, created, for instance, by a firm's R&D activities and incorporated into the firms best-selling product. In fact, the marginal effect of the interaction term

[38] For the subsample of UK-based firms, Bürgel et al. (2004) found a positive effect of start-up size on the probability of selecting a distributor, but only at the 10 % level of significance.

is relatively small. Setting all variables to their means, the interaction term decreases the probability of a change from direct exports to an intermediary by less than one percentage point.[39] Similarly to the firm managers' international experience, it might be argued that during an early stage of the firm's international engagement, intermediaries are a prerequisite for selling abroad in order to cope with the liability of alienness.

After becoming established in the foreign market, firms are able to select the sales mode that minimises transaction costs or that is best suited to the firms' intangible resources. Thus, the technology incorporated into the firms' products is more important for explaining a change from an intermediary to direct exports. However, switching from exporting via an intermediary to direct exports cannot exclusively be interpreted as a change from a formerly suboptimal sales mode (from a transaction-cost point of view) to an optimal one during a later stage of the firm's international engagement. This interpretation is only one possible scenario. Alternatively, choosing an intermediary during an early stage of the firm's export activities might have been perfectly optimal, because at the time of the first survey the exporter was producing its product using a "tried and tested" technology. The transaction-cost theory and the organisational capability perspective suggest that in this case a low-control sales mode (i.e., an intermediary) is preferred. However, 40 % of the exporters that were using a "tried and tested" technology at the time of the first survey changed to a novel and self-developed technology in the period between the two surveys. Thus, switching from an intermediary to direct exports was necessary because the exporter increased the degree of innovativeness of its product.

Interestingly, the dummy variable representing permanent R&D activities is not correlated with the probability of such a transition. This might be due to the fact that R&D constitutes an input variable and may not necessarily reflect the product's transaction-specific assets. It may be that firms carry out R&D not to realise product innovations, but rather to make process innovations. The latter may lead to cost reductions and, as a consequence, to lower prices and an improved competitiveness of the firm's product. Therefore, R&D activities may be able to explain the decision to internationalise, but may not have an impact on the choice of sales mode.[40] [41] More suitable for measuring transaction-specific assets is the dummy variable indicating novel and self-developed

[39] The marginal effects of the logit regressions will be discussed in greater detail below.

[40] In fact, analysing foreign market participation of the firms in our sample, I found that R&D activities can be used to discriminate between exporters and non-exporters (see Fryges 2004a).

[41] Estimating the determinants of entry mode choice for the firms of our sample, Bürgel et al. (2004) found a significantly negative effect of R&D intensity on the probability of choosing a distributor. However, the reported marginal effect is very small: A marginal increase in R&D intensity reduces the probability of using a distributor as the first sales mode by only 0.3 percentage points.

technology incorporated into the firm's product. This variable is presumably closely related to the technological characteristics of the product, since it directly reflects what firm managers said about their product.

As I hypothesised, a short window of opportunity decreases the probability of changing from direct exports to an intermediary and, conversely, increases the chance of switching in the reverse direction. Contrary to the hypothesis of Malhotra et al. (2003), high-tech firms that have to exploit their technological advantages in a very short period of time favour direct exports. If technically sophisticated products are replaced or upgraded at least once a year, this will require, among other things, expensive training of foreign distributors or agents which raises the costs of exporting via a distributor or an agent. In this case, exporting directly is preferred, even though the firm has to relinquish its foreign partner's knowledge of the local markets and its close contacts with potential foreign customers. The impact of a short window of opportunity might also be interpreted from Madhok's organisational capability perspective (cf. Madhok 1997). The notion of the OC perspective is that a firm exploits its competitive advantage in order to generate rents in a foreign market. The empirical results show that if the time period for exploiting a competitive advantage is limited, an integrated sales mode will be optimal.

The requirement for intense product customisation acts as a barrier to initiating exports via an intermediary. Since customisation demands close contacts to individual customers, the costs of selling abroad could be reduced by a foreign distributor who is assumed to already have such close contacts to foreign customers. On the other hand, customisation increases the costs of controlling the foreign partner. Our results imply that the latter effect dominates: Changing from direct exports to an intermediary is less likely if individual client customisation is prevalent. However, the dummy variable indicating intense customisation is not significant in the second transition equation. Once an exporter has chosen a foreign intermediary, the probability of changing the distribution channel is unaffected by the degree of customisation. Finding a foreign distributor and making a contractual agreement with it might be regarded as a sunk investment. Especially if customisation is important, such an investment might be relatively high, implying that switching from an intermediary to direct exports is observed less frequently. This could eventually explain the insignificant effect of product customisation on the transition probability from exporting via an intermediary to direct exports.

Consumer goods or services that are directly sold to end-users are generally distributed to the foreign market via an intermediary. Even if the firms have entered the foreign market by direct exports, e.g., because they received an unsolicited order from abroad, it is likely that they will try

to find an appropriate distributor or agent – at least if they intend to expand their international engagement. Similarly, it is less likely that a firm producing a consumer good will switch to direct exports if it is currently using a foreign intermediary. Comparing companies that produce a consumer good with firms that sell their products and services to other firms (either as a business service, an intermediate good or an investment good), our results show that for the latter firms, the probability of changing from direct exports to an intermediary is lower and that switching from an intermediary to direct exports is more likely once an intermediary has been chosen in the foreign market. The probability of changing to direct exports during a later stage of the firm's international engagement is even higher for business service firms than for manufacturing firms selling intermediate or investment goods (the base category), perhaps because e-commerce became more widespread in the period between the two surveys, offering software firms a relatively cheap way of distributing their services abroad.

The number of years a firm exports its products to a particular target market is assumed to be positively correlated with the use of direct exports. The longer a firm is engaged in a particular market, the more experience it is able to gain, allowing its ability to export directly to increase. In fact, the number of years the exporter is engaged in the target country has a positive effect on the probability of a transition from exporting via an intermediary to direct exports. However, the coefficient of this variable is also significantly positive in the second transition equation, which contradicts the theory and is inconsistent with the positive result in the other equation. The number of years a firm sells its products in a target country probably does not measure the experiential knowledge acquired by the exporter. Instead, the two positive coefficients might be interpreted in the sense that changing the dominant sales mode in a country is more likely the longer the firm is engaged in that country. Or in other words, it takes time to make a change. Binding contracts a firm has entered into with a foreign customer or a foreign distributor can make an early replacement of the used sales mode impossible.

The remaining target country-specific variables that were included in the regression equations are neither individually nor jointly significant.[42] The potential of the foreign target market, approximated by the target country's GDP, it is not relevant for changes in the sales modes used. As proposed by Anderson and Gatignon (1986), the rank of country risk has no individual effect on the selection of the optimal sales mode. Only the transaction term with permanent R&D activities decreases the probability of a transition from direct exports to exporting via an intermediary,

[42] Wald tests of joint significance of the three remaining country-specific variables: transition from direct exports to exporting via an intermediary: $\chi^2(3) = 3.17$, (Prob > $\chi^2$) = 0.366; transition from exporting via an intermediary to direct exports: $\chi^2(3) = 4.48$, (Prob > $\chi^2$) = 0.215.

although the effect is relatively small. Finally, the share of total sales generated in the region of the target market entered cannot explain why exporters change their sales modes either. The latter variable was intended to measure the importance of the particular target market for the exporting firm. Admittedly, this measure is rather vague, especially because the second survey contains only aggregated information about the share of total sales generated in several regions and none about the shares in the individual target markets. Moreover, the share of total sales might be endogenous since it can be regarded as a measure of the exporter's success in a country, which in turn might be influenced by the selected sales mode. Thus, it is impossible to say whether the variable proved to be insignificant because it is not suitable to measure the importance of a particular target country or whether a sales mode change is, in fact, independent of country-specific variables and can better be explained by firm-specific or transaction-specific assets.

In order to get further insights into how the individual variables affect the probability of switching to another sales mode, I calculated marginal effects. It is well known that the marginal effects vary with the values of $x$ (see, e.g., Greene 2000), and it is thus common practice to evaluate the marginal effects at the means of the independent variables. The results of this specification are given in Tables 9 and 10, labelled as Model 1. Whereas the probability of a transition from direct exports to exporting via an intermediary changes significantly as discussed above, the probability of a transition in the reverse direction is not influenced significantly by any of the independent variables, given that all variables are set to their mean. At first glance, this outcome is a bit surprising since we found some significant coefficients included in the vector $\hat{\beta}_{01}$. However, it was argued above that a change from exporting via an intermediary to direct exports was primarily observed during a later stage of a firm's engagement in a particular target market. The predicted probability of a transition from exporting via an intermediary to direct exports in dependence of the years since foreign market entry is depicted in the lower right graph in Figure 1 in the appendix, all other independent variables are set to their mean. The graph reflects the positive correlation between the time period of the exporter's engagement in the target country and the probability of a change to direct exports. In the early years of a firm's foreign engagement, a change to direct exports is very unlikely. Only after a twelve-year period does the probability of a change exceed the ten-percent level. However, not only the probability of a change to direct exports raises with the number of years since market entry. The uncertainty of predicting a transition also increases. Thus, the time period in which the exporter is engaged in the target market is less appropriate for predicting changes in sales modes during a later stage of the firm's export activities. In this case, firm-specific or transaction costs-specific variables are probably more suitable to predict a transition

from one sales mode to another. This argument is also true for a change from direct exports to exports via an intermediary as shown by the lower left graph in Figure 1.

Since a transition from exporting via an intermediary to direct exports is only probable during a later stage of an exporter's engagement in the target country, I took the mean number of years between target market entry and the year of the second survey, 2003, for calculating marginal effects. Moreover, the results of the logit regression have shown that switching to direct exports is also positively correlated with firm size (see also Figure 1). Since the firms in our sample grew in the period between the two surveys[43], I also used the mean number of employees at time of the second survey when calculating marginal effects. This specification is given in Table 10 as Model 2. For the third specification in Table 10, I additionally set the dummy variable indicating a novel, self-developed technology to the value 1. As discussed above, the percentage of exporters that used a novel technology at the time of the second survey had increased significantly compared with the first survey. Hence, it is useful to examine the marginal effects given a high degree of innovativeness incorporated into the firm's product.

In Table 9, which reflects the marginal effects on the transition probability from direct exports to exporting via an intermediary, I varied the two continuous variables (number of employees; years since target market entry) in a similar way. Specification 2 shows the marginal effects, setting the two continuous variables to their mean at the time of the first survey, whereas in Model 3, these variables take the value of the mean at the time of the second survey. All other independent variables were set to their overall mean.

The two industry dummy variables have the highest marginal effects on the probability of a change from direct exports to exporting via an intermediary.[44] The second most important marginal effect comes from the dummy variable indicating a consumer good, followed by the dummy reflecting a short window of opportunity and the dummy indicating intense product customisation. As already mentioned, the marginal effect of the interaction term between the rank of country risk and permanent R&D activities is rather small. It only increases the transition probability by about one percentage point. The order of the marginal effects on the probability of switching from exporting via an intermediary to direct exports is similar. Neglecting the influence of the years since target market entry, the highest marginal effect is attributed to the dummy variable indicating that the firm's service is primarily sold to other companies as a business service, followed by the dummy

[43] The annualised employment growth rate in the period from 1997 to 2002 of our sample's exporters amounts to 7.7 percent (see Fryges 2004b).

[44] The marginal effect for a dummy variable is the discrete change of the dummy variable from 0 to 1.

reflecting the firm managers' international experience and the dummy for the engineering sector (see Model 2 in Table 10). The marginal effects of the remaining independent variables that had a significant coefficient increase the probability of a transition to direct exports by between seven and ten percentages points in Specification 2.

The strongest predictors in the transition equations are the dummy variables controlling for unobserved industry-specific factors and those indicating a typical customer of the firms' products or services. Thus, the choice of sales modes is, to a relatively large degree, determined by strategic and structural influences that are not observed. Moreover, traditional distribution channels exist for certain kinds of products. For example, a consumer good is traditionally sold via an intermediary, regardless of the context. Hence, the high explanatory power of the dummy indicating a typical customer might reflect embedded routines and experiences the firm has in supplying such a typical customer, e.g., when distributing its product in the domestic market.[45] On the other hand, variables that are intended to measure transaction cost-specific assets (e.g., product customisation) or the firm's (intangible) resources are of minor importance. Nevertheless, the variables derived from the theoretical literature must not be neglected when explaining changes of sales modes. For example, the dummy variable indicating a novel, self-developed technology becomes a good predictor for a transition from an intermediary to direct exports during a later stage of a firm's international engagement.

The empirical model fits well with the data. In the logit model explaining the determinants of a transition from direct exports to exporting via an intermediary, McFadden's $R^2$ reaches a value of 0.355. In the logit model examining a reverse transition, McFadden's $R^2$ is 0.419.

## 6 Conclusion

The objective of this paper is to examine the change of sales modes in foreign markets by German and UK-based technology-oriented firms. For this purpose, I investigated a longitudinal data set of about 200 German and British technology-oriented firms that were founded in the period between 1987 and 1996, inclusively. The firms were contacted using two surveys conducted in 1997 and 2003. The two most frequently used sales modes were direct exports and exporting via an interme-

[45] The first survey this paper is based on also contains information about the dominant sales mode used in the domestic market, i.e., whether the firm's product is primarily sold via distributors or by direct sales from headquarters. Bürgel and Murray (2000) included this information when estimating a probit model of the choice on entry mode into a foreign market of the UK-based firms of our sample. They found out that the domestic sales mode is the strongest predictor of the chosen foreign entry mode. This finding stresses the importance of firm-specific routines.

diary. Even in 2003, when our sample's exporters had been engaged in their most important target markets for an average of 9 years, more resource-intensive sales modes like sales subsidiaries or even FDI were still of minor importance. Therefore, this paper examines changes between the two distinct modes of exporting. Descriptive analyses reveal that just under 16 % of exporters that sold their products directly to their foreign customers in the previous period switched to exporting via an intermediary. A sales mode change in this direction was observed (not exclusively but) primarily in the period between target market entry and the first survey, i.e., during an early stage of the firms' export activities. On the other hand, a change in the reverse direction took place primarily in a later stage of the firms' international engagement. Just under 10 % of those firms that exported via an intermediary in the previous period changed to direct exports. Thus, we observe a high persistence in the sales modes used over time, probably because of the existence of sunk costs or because of binding contracts an exporter made with its foreign distributors or customers.

The only theory that derived a time-dependent order of sales modes, the internationalisation process model, is not suitable for explaining the behaviour of young firms in high-tech sectors. The descriptive result that firms change from direct exports to exporting via an intermediary during an early stage of their international engagement and that a transition in the other direction is observed during a later stage already contradicts the notion of the process model that an exporter gradually increases its commitment in a foreign market, regardless of which sales mode is considered as the more resource-intensive commitment. Furthermore, the percentage of firms that use resource-intensive sales modes like sales subsidiaries is still relatively small, leaving almost no evidence that firms incrementally raise their commitment of resources.

Instead, the econometric analysis confirms that the transaction-cost theory and the resource-based view of the firm (and the organisational capability perspective which is based on the latter theory) are both relevant for explaining the probability of switching from one sales mode to another. Alternatively, Dunning's eclectic paradigm turned out to be a useful framework for investigating sales mode changes – apart from the fact that we do not find evidence for the relevance of locational advantages. Nevertheless, ownership advantages (e.g., the firm's physical, financial, and intangible assets) and internalisation advantages (e.g., transaction-specific assets like the requirement of intense product customisation) are decisive for selecting the optimal sales mode, especially for predicting a sales mode change from exporting via an intermediary to direct exports. This is an important result since most existing empirical studies examine either the choice of entry mode (i.e., the first sales mode used in a foreign market) or the selection of the sales mode used by a firm at a particular point in time. This study proves that those theories, which are already known to be able to account for the choice of entry modes, are also appropriate for explaining changes of

sales modes, or in other words, a sequence of sales modes observed over a longer time period. The main managerial implication of this paper's analyses is that from a transaction-cost reasoning and an organisational capability perspective, an exporter of a high-tech product which incorporates highly sophisticated technologies should use an integrated sales mode, that is, in the case of a young and small high-tech firm, direct exporting.

However, especially during an early stage of a high-tech firm's international engagement there are strategic and structural influences that might dominate the impact of the exporter's (intangible) resources or its transaction-specific assets. Due to the liability of alienness, an exporter might be forced to use an intermediary to sell its products abroad, since foreign customers might not trust a young and small firm that is even not established in its domestic market. In this case, the reputation of an established foreign distributor or agent might be a way of gaining indirect legitimacy. After becoming established in the foreign market, the domestic high-tech firm might be able to refrain from a foreign distributor and decide on its sales mode based on its intangible and transaction-specific assets.[46] Moreover, the transaction-cost reasoning and the OC perspective might be dominated by the existence of traditional distribution channels. Consumer goods, for example, are traditionally distributed via intermediaries. Of course, these traditional sales modes might change over time. The growing importance of e-commerce for distributing software and other digital products might induce software firms to change to direct exports via the Internet. Our results are consistent with this interpretation. Finally, this paper's empirical results show that there are unobserved industry-specific effects which are actually the best predictors in our model. Therefore, in order to explain the selection of sales modes by young high-tech firms, the theories usually applied are useful but not sufficient. Firms might deviate from the sales mode choice predicted by existing theories. Future research should pay more attention to these strategic constraints a young high-tech firm has to consider in order to better understand a chosen sequence of sales modes.

[46] Bürgel and Murray (2000) further argued that accepting the product of a young innovative firm might not be attractive from the foreign distributor's point of view either. The distributor also has to invest, for instance, in specialised training of his sales personnel, although the return of this investment is highly uncertain. Thus, the distributor has to be paid to bear this risk, which makes exporting via an intermediary quite expensive for a small high-tech firm. If it is nonetheless forced to use an intermediary in the foreign market due to the liability of alienness, it will be interested in switching to direct exports as early as possible.

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## Appendix

### Table 7: Definition of High-Tech Sectors

| Aggregated industries used | NACE Rev. 1 | Short description according to NACE Rev.1 |
|---|---|---|
| R&D-Intensive Service Industries | 64.20; 72.20; 72.30; 72.40; 72.60; 73.10 | Telecommunication, Computer Programming and Software Services, Data Processing, Misc. Computer Services, R&D in Natural Sciences and Engineering |
| ICT-Hardware | 30.01; 30.02; 32.20; 32.30 | Office Equipment; Computers and other Information Processing Equipment; Television and Radio Transmitters and Apparatus for Line Telephony and Line Telegraphy; Television and Radio Receivers, Sound or Video Recording and Reproducing Apparatus |
| Engineering Industries | 33.20; 33.30; 33.40 | Electronic Instruments and Appliances for Measuring, Checking (except Industrial Process Control); Electronic Industrial Process Control Equipment; Optical Instruments; Photographic Equipment |
| Health and Life Sciences | 24.41; 24.42; 33.10 | Pharmaceutical Products and Preparations; Medical and Surgical Equipment and Orthopaedic Appliances |
| Other High-Tech Manufacturing | 24.16; 24.17; 31.10; 31.20; 32.10; 35.30 | Plastics and Synthetic Rubber in Primary Form; Electric Motors, Generators and Transformers; Electricity Distribution and Control Apparatus; Electronic Valves, Tubes and other Components; Aircraft and Spacecraft Manufacturing |

Source: Manufacturing sector: Butchart (1987); service sector: Bürgel et al. (2004).

### Table 8: Sample Composition of the Population of High-Tech Firms, 1997 and 2003

| | **Surviving firms 1997** | | | **Surviving firms 2003** | | |
|---|---|---|---|---|---|---|
| Employees | Manufacturing | Services | Total | Manufacturing | Services | Total |
| **Germany** | | | | | | |
| 3-5 | 637 | 1,241 | 1,878 | 508 | 959 | 1,467 |
| 6-9 | 401 | 654 | 1,055 | 338 | 517 | 855 |
| 10-19 | 525 | 596 | 1,121 | 437 | 463 | 900 |
| 20+ | 621 | 370 | 991 | 515 | 269 | 784 |
| Total | 2,184 | 2,861 | 5,045 | 1,798 | 2,208 | 4,006 |
| **UK** | | | | | | |
| 3-5 | 673 | 742 | 1,415 | 581 | 643 | 1,224 |
| 6-9 | 474 | 370 | 844 | 405 | 286 | 691 |
| 10-19 | 472 | 292 | 764 | 411 | 210 | 621 |
| 20+ | 362 | 177 | 539 | 277 | 141 | 418 |
| Total | 1,981 | 1,581 | 3,562 | 1,674 | 1,280 | 2,954 |

Note: The 1997 assignment of a single firm to a stratification cell was used.

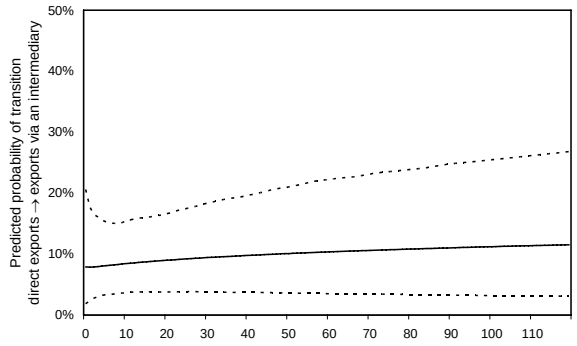
Source: ZEW, University of Exeter.

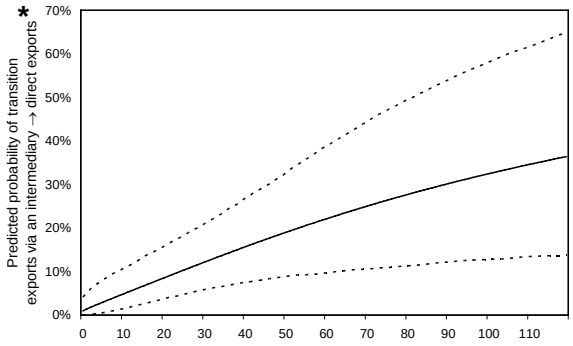
## Figure 1: Predicted Probability of Transition

### Transition direct exports→ intermediary

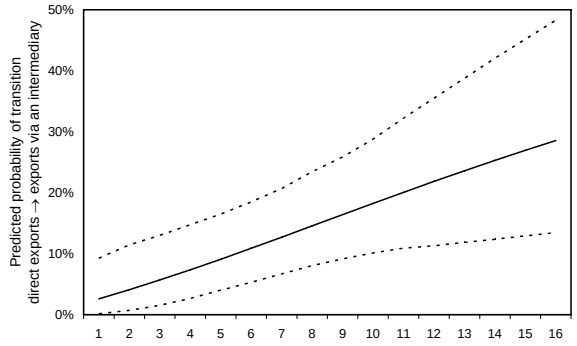
### Transition intermediary → direct exports

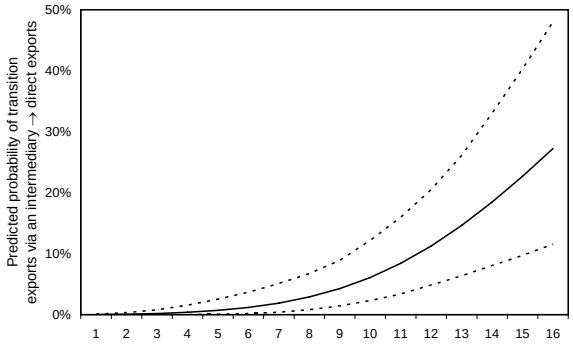
Predicted probability in dependence of
the number of employees




Predicted probability in dependence of
years since entry into target country




**Solid line**: predicted probability of transition in dependence of the continuous variable, all other variables set to their mean.

**Dotted lines**: simulated 90 % confidence interval, using 1,000 simulations.

***** Years since target market entry set to the mean of 2003.

Source: own calculation.

**Table 9: Marginal Effects of Logit Model – Sales Mode Change from Direct Exports to Exporting via an Intermediary**

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| | Prob. of change = 0.080 | Prob. of change = 0.050 | Prob. of change = 0.177 |
| | *Marginal effect (robust stand. error)* | *Marginal effect (robust stand. error)* | *Marginal effect (robust stand. error)* |
| Country | -0.020 (0.057) | -0.013 (0.036) | -0.039 (0.113) |
| Engineering | 0.537 (0.203)*** | 0.419 (0.178)** | 0.703 (0.210)*** |
| Other manufacturing industries | 0.371 (0.150)** | 0.268 (0.113)** | 0.558 (0.216)** |
| Log (number of employees) | 0.007 (0.020) | 0.004 (0.013) | 0.013 (0.037) |
| International experience of management | 0.059 (0.045) | 0.037 (0.034) | 0.120 (0.080) |
| Permanent R&D activities | 0.054 (0.051) | 0.034 (0.036) | 0.109 (0.098) |
| Interaction (country risk * perm. R&D) | -0.007 (0.004)* | -0.005 (0.003) | -0.014 (0.006)** |
| Novel, self-developed technology | -0.016 (0.095) | -0.011 (0.059) | -0.033 (0.195) |
| Interaction (country risk * novel tech.) | -0.000 (0.005) | -0.000 (0.003) | -0.001 (0.009) |
| Window of opportunity ≤ 12 months | -0.206 (0.086)** | -0.139 (0.072)* | -0.356 (0.140)** |
| Intense product customisation | -0.094 (0.055)* | -0.061 (0.044) | -0.178 (0.088)** |
| Consumer good | 0.234 (0.086)*** | 0.161 (0.075)** | 0.389 (0.136)*** |
| Business service | 0.141 (0.109) | 0.095 (0.075) | 0.242 (0.187) |
| Log (years since entry into target country) | 0.091 (0.036)** | 0.058 (0.020)*** | 0.179 (0.111) |
| Log (GDP of target country) | -0.003 (0.023) | -0.002 (0.014) | -0.006 (0.046) |
| Rank of country risk 1998 | 0.004 (0.004) | 0.003 (0.003) | 0.008 (0.007) |
| Share of total sales generated in the target country's region | -0.001 (0.002) | -0.001 (0.001) | -0.002 (0.003) |

**Model 1:** All variables set to their overall mean.

**Model 2:** Like Model 1, but log (employees) and log (years since entry into target country) set to their mean of 1997.

**Model 3:** Like Model 1, but log (employees) and log (years since entry into target country) set to their mean of 2003.

* 10 % level of significance; ** 5 % level of significance; *** 1 % level of significance.

Base category: entry of a UK-based software/service firm.

Source: own estimation.

**Table 10: Marginal Effects of Logit Model – Sales Mode Change from Exporting via an Intermediary to Direct Exports**

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| | Prob. of change = 0.006 | Prob. of change = 0.077 | Prob. of change = 0.200 |
| | *Marginal effect (robust stand. error)* | *Marginal effect (robust stand. error)* | *Marginal effect (robust stand. error)* |
| Country | 0.006<br>(0.006) | 0.071<br>(0.056) | 0.153<br>(0.125) |
| Engineering | -0.012<br>(0.012) | -0.131<br>(0.069)* | -0.292<br>(0.127)** |
| Other manufacturing industries | -0.001<br>(0.006) | -0.017<br>(0.066) | -0.038<br>(0.144) |
| Log (number of employees) | 0.007<br>(0.005) | 0.074<br>(0.034)** | 0.167<br>(0.071)** |
| International experience of management | 0.008<br>(0.007) | 0.097<br>(0.036)*** | 0.234<br>(0.082)*** |
| Permanent R&D activities | -0.006<br>(0.007) | -0.066<br>(0.061) | -0.140<br>(0.129) |
| Interaction (country risk * perm. R&D) | -0.000<br>(0.000) | -0.002<br>(0.003) | -0.004<br>(0.007) |
| Novel, self-developed technology | 0.016<br>(0.017) | 0.167<br>(0.081)** | 0.167<br>(0.081)** |
| Interaction (country risk * novel tech.) | -0.000<br>(0.000) | -0.004<br>(0.004) | -0.009<br>(0.009) |
| Window of opportunity ≤ 12 months | 0.008<br>(0.008) | 0.083<br>(0.050)* | 0.180<br>(0.095)* |
| Intense product customisation | 0.006<br>(0.008) | 0.067<br>(0.060) | 0.144<br>(0.119) |
| Consumer good | -0.008<br>(0.008) | -0.087<br>(0.047)* | -0.192<br>(0.116)* |
| Business service | 0.109<br>(0.077) | 0.568<br>(0.197)*** | 0.674<br>(0.134)*** |
| Log (years since entry into target country) | 0.024<br>(0.017) | 0.269<br>(0.120)** | 0.607<br>(0.210)*** |
| Log (GDP of target country) | -0.002<br>(0.002) | -0.022<br>(0.020) | -0.049<br>(0.041) |
| Rank of country risk 1998 | 0.000<br>(0.000) | 0.003<br>(0.003) | 0.006<br>(0.007) |
| Share of total sales generated in the target country's region | -0.000<br>(0.000) | -0.001<br>(0.002) | -0.001<br>(0.004) |

**Model 1:** All variables set to their overall mean.

**Model 2:** Like Model 1, but log (employees) and log (years since entry into target country) set to their mean of 2003.

**Model 3:** Like Model 2, but dummy variable indicating novel, self-developed technology set to "1".

* 10 % level of significance; ** 5 % level of significance; *** 1 % level of significance.

Base category: entry of a UK-based software/service firm.

Source: own estimation.