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Scottish Sustainable Internationalisation: What are the determinants of firm exporting?

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<u>Abstract</u>

The aim of this thesis is to estimate which types of firms export and which processes firms go through before becoming exporters. This involves determining which variables, such as age and industry, help determine firms as exporters in Scotland. Other areas investigated include the relationship between exporting intensity and levels of exporting experience across European firms.

Previous studies were limited because of the lack of Scottish data, for this a new survey had to be created; this was a challenge to devise and carry out. This part of the thesis was crucial as the information from this survey would then be used to find firms to interview. This involved face to face interviews and phone interviews of the firms, with a member of the management of the firm, which gave further qualitative information to the survey. Additionally another data set, for European firms, was utilized to study other relationships, such as between exporting intensity.

In the first empirical chapter, the determinants of exporting are explored: first utilizing the most current information available at the time and then with a self made survey. The next chapter involved interviews of firms chosen from the self made survey; these interviews attempted to discover differences between exporters and non-exporters and examined the motivations and advantages exporters may have had. The last chapter examined other firms in Europe, using a different data set, the purpose of which was to help support the work done on Scottish firms and also to make use of other information, such as on exporting intensity, which was not collected for Scottish firms.

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I am also extremely grateful for the love and support to my parents and sister.

Declaration

I declare that this research is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution. I acknowledge the work of others in explicit references at the end of the thesis.

The copyright of this thesis rests with the author. Use of any material contained in, or derived from this thesis must be acknowledged appropriately.

Signature: _____

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Abbreviations

CIS	Community Innovation Survey
EU	European Union
IDBR	Inter Departmental Business Register
OLS	Ordinary Least Squares
MNE	Multinational Enterprise
R&D	Research and Development
RGT	Repertory grid technique
SIC	Standard Industrial Classification
SME	Small and Medium Enterprise
TFP	Total Factor Productivity
UK	United Kingdom

1. Introduction

1.1. Introduction

This Ph.D. examines internationalisation from a Scottish perspective. Calof and Beamish (1995) define internationalisation as the adaptation of firm's operations, such as strategy and structure, to international environments. To study internationalisation in Scotland, this thesis examines the determinants of exporting within samples of Scottish firms for 2009 and 2011, a sample of European firms for 2009 and interviews of Scottish firms in 2011 for more qualitative depth. This means examining previous held theories on the characteristics and motivations that have made firms exporters. This thesis will help show the causes of exporting, either reinforcing or suggesting new characteristics that are crucial in exporting and from a policy standpoint be able to suggest what makes a successful exporter.

1.2. Motivation

The motivation for this study is that in an ever increasing competitive global marketplace, it is increasingly important to understand the factors that determine exporting. Export growth may represent an increase in demand for the country's output and thus serves to increase production and sales arises as a result of higher demand pressure. International trade may boost the productivity level of firms and may cause the general level of skills to rise in the export sector from the extra competition. Additionally export growth potentially improves the balance of trade.

Within Scotland that exporting direction is led by SDI (Scottish Development International), whose Strategic Direction and Priorities for three years (2010–13).

- attract investment and talent which builds on Scotland's globally competitive sectors;

- raise the aspirations and capabilities of more Scottish businesses to think, compete and trade globally; and

- actively work with others to increase the global competitiveness of the business environment in Scotland and to align the wider promotion of Scotland internationally.

Throughout this thesis the papers mentioned are only a selection of the vast literature, theoretically, empirically through models and case studies that have been used in many different countries to explain exporting. Generally there is a consensus that firms that export are "stronger", for example, Bernard and Jensen (1999) find that exporting firms, "have a greater probability of survival, growth is higher, productivity is greater, they are more capital-intensive, pay higher wages, employ more technology and have more skilled workers." Wagner (2007) survey 54 micro-econometric studies, which include data for firms from 34 countries, published between 1995 and 2006, which shows that exporting firms are more productive than non-exporters. There are other less direct ways that firms might be improved as exporting could improve a firm's skills and capabilities through the competition of overseas markets. Bernard and Jensen (1999) studying US firm's econometrically show exporting improves the survivability of SMEs. Kimura and Fujii (2003) conduct a Cox-type survival analysis of Japanese corporate firms in the mid-1990s, finding that exporting makes firms more competitive and render them more likely to survive. For the UK, Harris and Li (2010) use a Cox-type survival analysis on UK firms empirically from 1997-2003, finding that, "the probability of closure is (cet. par.) significantly lower for exporters."

Zahra et al. (2000) examined the effects of international expansion, as measured by international diversity and mode of market entry, on a firm's technological learning and the effects of this learning on the firm's financial performance. They find that, "there is a strong relationship between international diversity and mode of market entry and the breadth, depth, and speed of a new venture firm's technological learning, especially when the firm undertakes formal knowledge integration. In turn, the breadth, depth, and speed of technological learning are related to new venture firm performance. International diversity and mode of international entry are also positively related to new venture performance." Thomas and Eden (2004) list some of the benefits of being multinational: exploiting cross-national differences; diversifying revenues launching attacks on rivals; fend off rivals' attacks; and satisfy diverse customer needs. Empirically testing the effects of exporting on manufacturing firms included in the S&P 500 during the 1990-1994 period they find that "there are initial benefits from multi-nationality that are then outweighed by rising costs of going abroad; however, over time, the long-run benefits dominate the costs, suggesting a significant, positive relationship between multi-nationality and long-run market performance." Other studies have found that exporting can improve increases domestic sales, such as Berman et al. (2010), who use a firm-level database on nine developing and emerging economies, which combines balance-sheet and product-destination-specific

export information over the period 1995-2001, and they find that, "exogenous variations in foreign sales are positively associated with domestic sales, even after controlling for changes in domestic demand. A 10% exogenous increase in exports generates a 1.5 to 3% increase in domestic sales in the short-term. This result is robust to various estimation techniques, instruments, controls, and sub-samples." Baldwin and Gu (2004) explain that in domestic markets that are relatively small, exporting enables firms to expand, increasing the commercial lifespan of existing products or services.

Nguyen, et al. (2007) list the reasons that firms may wish to export:

- Increase sales and profits thus enhancing chances of survival
- Reduce dependence on existing markets
- Stabilize seasonal market fluctuations
- Utilize excess production capacity
- Improve productivity
- Enhance domestic competitiveness
- Enhance potential for corporate expansion
- Extend the sales potential of existing products
- Contribute towards the reduction of the trade deficit
- Contribute towards accelerated employment creation
- Gain information about foreign competition

It has been suggested that exporters can improve their productivity as they export, this is termed 'learning by-exporting'. This effect is disputed, there have been various contradictory findings in this area, partly because different samples are used and also partly because different methodologies have been used. Bernard and Jensen (1999) examined firms in the USA, studying whether there are extra productivity gains to firms after they export. They found that firms who export are better (they are able or choose to export having higher levels of productivity); "However, there is substantial evidence that exporting does not confer the Midas touch. Most plant attributes, especially productivity, grow no faster, and even slower, at today's exporters." Other studies show a positive effect on productivity of exporting (at different times and in different countries), such as Kraay (1999) whether firms "learn" from exporting, using a panel of 2105 Chinese industrial enterprises between 1988 and 1992, find that exporting leads to significant improvements in enterprise's performance. "Controlling for past performance and unobserved firm characteristics, past exports lead to significant improvements in enterprise performance.

Interestingly, these learning effects are most pronounced among established exporters. For new entrants to export markets, learning effects are insignificant and occasionally negative." Castellani (2002) studying Italian manufacturing firms found that, "The key finding is that productivity growth is influenced by firms' export intensity and not simply by the presence in the export market. The main implication one can draw from these results is that learning effects occur only above a certain threshold of foreign involvement. In particular, the Italian experience suggests that the higher the orientation towards international markets, the higher the firms' productivity growth." Van Biesebroeck (2005) studying manufacturing firms in nine African countries found that exporters increase their productivity advantage after entry into the export market, "They not only have higher post-entry productivity levels, but also higher post-entry rates of productivity growth. This productivity advantage for exporters remains after controlling for the endogenous export decision with instrumental variables, when the export participation is estimated jointly with the production function, or when sample selection is controlled for non-parametrically." De Loecker (2007) using firm level data of Slovenian manufacturing firms operating between the period 1994-2000, finds productivity improves for exporter, "Overall I find that export entrants become more productive once they start exporting. The productivity gap between exporters and their domestic counterparts increases further over time." Fernandes & Isgut (2005) studying Colombia's manufacturing firms for the years 1981 to 1991, find positive effects of export experience on productivity, stronger for plants with the most exposure to exporting, and statistically insignificant for exporters that stop exporting. "We focus our empirical investigation of learning-by-exporting on young plants, which are much more likely than old, established plants to face new technical and organizational challenges. We also favour using measures of export experience to study whether productivity improvements are associated with the extent of exposure to export markets. We find strong evidence of learning-by-exporting for our sample of young Colombian manufacturing plants."

Several earlier studies have examined the issue in the context of UK, for example, Girma et al (2004) investigates exporting and firm performance for a large panel of UK manufacturing firms, applying matching techniques. The authors find that exporters are more productive and that exporting further increases firm productivity. "In applying matching analysis we ensure that the characteristics of exporters and non-exporters are as close as they can be, allowing us to drive out effects that can be reliably attributed to exporting. We find that exporters are typically larger and more productive than non exporters; and, like all other analysts, we find that they self-select, in that they were more

productive before they entered. Some of our other key findings are in contrast to other work, however. The major contrast with most other work is that exporting may boost productivity." Harris and Li (2012), analysing the UK for 1996–2004 period, find that, "A substantial post entry productivity gain for firms new to exporting; a negative productivity effect for firms exiting overseas markets; and significant productivity gains for those that are observed to have both switched into and out of export markets." They also find that, "Our main results for firms in 14 separate UK industry groups (covering 1996–2004) confirm that significant productivity effects linked to export-market dynamics is by no means universal; and even within industry groups there are differences amongst entrants, exitors, and those that experience both entry and exit into overseas markets. The results across industries are nevertheless consistent with larger productivity gains in industries more exposed to globalization, and where there is evidence of higher levels of intangible assets."

A particularly fertile avenue of research has been on the nexus or the agglomeration of innovation and exporting. Innovation might lead to exporting and exporting to innovation, as exporting forces a higher level of customisation in products which improves the capacity of a firm for change. Golovko and Valentini (2011) state the idea that innovation and export are complementary strategies for SMEs' growth. "Participating in export markets can promote firms' learning, and thus enhance innovation performance. At the same time, through innovation, firms can enter new geographical markets with novel and better products, therefore making exports more successful, and, by the same token, they can also improve the quality – and consequently increase the sales – of the products sold domestically."

Within the UK, Katsikeas and Skarmeas (2003) find that, "highly effective export sales organisations are characterised by higher levels of export sales management control and organisation design. They also have export managers demonstrating superior behavioural attributes, such as export sales planning, presentation, adaptive selling, sales support, and technical knowledge; and distinctive characteristics such as professional competence and customer orientation." Harris and Moffatt (2012) using firm level data for UK firms find that, "Being involved in exporting increased the probability that an establishment was engaged in spending on R&D. Spending on R&D in manufacturing had a much larger impact on the probability of exporting which implies that improve the establishment's knowledge assets which would in turn help it break down barriers to international markets. In non-manufacturing, spending on R&D increased the probability of innovating but had

no significant impact on whether the establishment exported; rather, innovating increased the probability of exporting."

1.3. <u>Aims and Objectives</u>

The aim of this study is to investigate the relationship between the firm level variables that determine a firm as an exporter. There are many theories, such as firms being more incremental in their build-up of exporting knowledge, therefore meaning that age is a critical factor. A review of the literature identifies the theories of how and why firms export (i.e. Uppsala theory of internationalization or Born-global firm theory) and the variables from the corresponding theory such as age variables. For empirical analysis; the primary data was the GCS (Global Connection Survey 2006) and a self-made survey 2010, both solely for Scottish firms. Additionally data from an EIM/GDCC (Internationalisation of European SMEs) survey done in 2009 was utilised for firm level data for firms across Europe. For a more qualitative analysis, interviews were also done of Scottish firms in 2011.

The advantages of this thesis are that it will analyse more current and specific information to Scotland which may have different effects, separate to the UK. Also the synthesis of the quantitative economic models and the more qualitative interviews allow for a more encompassing and holistic view. Disregarding either the economist's view, which has more emphasis the characteristics of the firms, or the management school view which has more emphasis on the motivations and behaviours of the view may miss crucial details.

1.4. Chapter Summaries

There are a total of six chapters in addition to this introduction. Chapter 2 contains the theories of exporting to help develop a framework, such as the network theory of internationalisation. Chapter 3 uses these theories to explain the variables at firm level, such as the innovation variables that maybe significant. Chapter 4 involves modelling the determinants of exporting for Scottish firms using the GCS and a self-made survey; this survey involved using a post and a specialist online survey tool. Chapter 5 has interviews with Scottish firms both of exporters and non-exporters, the firms chosen for interviews are taken from the models in chapter 4, meaning that there is a more valid comparison with more information available on the firms, with information on the propensity to export for these firms created in chapter 4, a direct comparison between exporters and non-exporters with similar propensities to export is possible. Chapter 6 uses the EIM/GDCC survey to examine propensity to export, intensity of exporting, and exporting experience (time spent of firm's existence exporting) and whether the variables have different effect on exporters of different ages (that have presumably moved past some of the initial exporting barriers). The thesis finishes with a conclusion in chapter 7, with policy recommendations and ideas for further research.

2. <u>Summary of theories on exporting</u>

Recent economic theory on exporting is dominated by Melitz's (2003) seminal model. In this model of the more productive and larger firms, these firms have the ability to absorb more of the sunk costs of exporting, making the process of exporting less risky; predicting that the most productive firms participate in export markets while less productive firms serve the domestic market only. Leonidou et al (1998) explains there has not been a consensus on what drives firms to export. There are different theoretical frameworks that have been used to explain the exporting decision of firms such as the stage of internationalization process and stage models of Johanson and Vahlne (1977) which deals with the Uppsala trade theory; Born Global firms (e,g. Oviatt and McDougall (1994)); the network theory of internationalization from many, such as Johanson and Mattson (1988); resource based view e.g. Barney (1991); innovation (e.g. Love and Roper (2002)); eclectic paradigm (Dunning (1977)); and oligopolistic reaction theory (e.g. Knicerbocker (1973)).

Perhaps as important as the economic characteristics of a firm are the behaviours of a firm, such as firms being proactive in searching the markets for new places to sell their goods or being reactive and only exporting in response to unsolicited orders when proposed to by customers from abroad. O'Farrell and Wood (1998) studying south east England and Scotland mention that there can be a very unsystematic approach to exporting by managers relying on orders from new customers, with the most common entry mechanism involves responding to particular orders.

The corollary to the determinants is the barriers that might prevent exporting, such as lack of qualified staff. Gomez-Mejia (1988) argued that human resource constraints could be a serious barrier to export adoption and expansion. Chaney (2005) builds a model of international trade with liquidity constraints; based on this model only those firms that have sufficient liquidity are able to export. Additional barriers caused by financial constraints have been found by Mayneris (2010) and Berman and Hericourt (2010) modelling liquidity constraints and exports. However, Arndt et Al. (2009) studying German firms find financial constraints and financial conditions have no strong effect on internationalization. The most recent specific study of these barriers in the UK was done by Kneller and Pisu (2007) using a survey specifically commissioned by UKTI. They found that, "Identifying the first contact and marketing costs appear to be the most important barriers to export. Other relevant barriers seem to be establishing an initial

dialogue with prospective clients and partners and building relationships with key influencers and decision-makers. For other barriers, such as language, obtaining basic information about foreign markets, and dealing with legal, financial and tax regulation overseas, the probability of facing them is lower."

One of the earliest theories on exporting at the firm level comes from Vernon (1966) who suggested a model whereby firms extend their product range across into the countries with inferior production technology. In the initial stage firms in the developed countries will develop superior good due to advantages in production technology. The firms in these countries then extend the range of products overseas to countries that do not have the same range and quality of goods. Vernon (1979) expanded this theory by suggesting the differences between countries would in fact be reduced through trade. Regions would converge together in terms of ideas such as due to the increased process of internationalization and globalization which had led to a smaller economic gap between Western Europe and the USA. Different technologies would become more evenly spread across the world and that in turn would mean that the advantages of these product cycles were weaker than before.

Barrett & Wilkinson (1986) studying Australian manufacturing firms managerial variables find that there are significant differences among firms at different levels of the internationalization process in terms of the personal characteristics of managers, managers' planning orientations and managers' attitudes towards exporting. Axinn (1988) survey for US and Canada, find that, "exporter's problems are primarily external or market based, whereas non-exporters perceived internal anxiety about exporting. Exporters problems -i.e. matching competitors' prices, promoting product overseas, establishing distribution network overseas, getting information about foreign markets, necessity to grant credit facilities to foreign buyers, establishing contacts with foreign customers." Manolova et al (2002) compare the relative importance of four dimensions of "Human capital: international business skills, international orientation, perceptions of the environment, and demographic characteristics, and analyse these based on the industrial technology sector (i.e. primary, secondary and tertiary)". They find that, "the environmental perceptions and self assessed strengths in international business skills are significant." ….."If the owner/founder or manager perceives that there is a lower level of environmental uncertainty in a particular international market, or perceives that there is the requisite skill set to internationalize, then chances are high that the small firm will be pursuing a strategy of internationalization."

Leonidou et al. (2007) examined the motivations that might lead firms to export and their list is presented below in figure 2.1.

Figure 2.1: Motivations to export as per Leonidou et al. (2007) : Internal and external

Human resource:	Special managerial interest/urge (P) Utilisation of special managerial talent/skills/time (P) Management trips overseas (P)
Financial:	Stagnation/decline in domestic sales/profits (R) Potential for extra sales/profits from exporting (P) Potential for extra growth from exporting (P) Possession of financial competitive advantage (P)
Production:	Accumulation of unsold inventory/overproduction (R) Achievement of economies of scale (P) Availability of unutilised production capacity (R) Smoothing production of a seasonal product (R)
Research & Development:	Possession of proprietary technical knowledge (P) Possession of a unique/patented product (P) Extending life-cycle of domestic products (P)
Marketing:	Possession of a marketing competitive advantage (P) Ability to easily adapt marketing for foreign markets (P)

Domestic market:	Saturation/shrinkage of domestic market (R) Need to reduce dependence on and risk of domestic market (R) Possibility of reducing the power of domestic customers (P) Unfavourable state of domestic economy (R) Favourable foreign exchange rates (R)
Foreign market:	Possession of exclusive information on foreign markets (P) Identification of better opportunities abroad (P) Close physical proximity to foreign markets (R)
Home government:	Government export assistance/incentives (P) Ministry of Commerce/trade mission activity (R) Encouragement by government agencies (R)
Foreign government:	Relaxation of foreign rules and regulations in certain foreign markets (R) Reduction of tariffs/non-tariffs in certain overseas countries (R)
Intermediaries:	Encouragement by industry, trade, and other associations (R) Encouragement by banks/financial institutions (R) Encouragement by brokers/agents/distributors (R)
Competition:	Intense domestic competition (R) Initiation of exports by domestic competitors (R) Entry of a foreign competitor in the home market (R) Gaining foreign expertise to improve domestic competitiveness (P)
Customers:	Receipt of unsolicited orders from foreign customers (R) Receipt of orders after participation in trade fairs (R)
Miscellaneous:	Proximity to international ports/airports (R) Patriotic duty of local firms (P)

Note: (P) = proactive and (R) = reactive

Source: Leonidou et al. (2007)

2.1. Sunk costs and productivity

The sunk costs (initial large investment by a firm) to a firm of becoming an exporter include R&D spending to improve product quality of business and marketing connections in foreign countries. Baldwin (1988) describes sunk costs as the costs of establishing a distribution and service network, and the costs of launching a product or advertising. Wagner (2007b) state that "Details aside the big picture that emerges after ten years of micro econometric research in the relationship between exporting and productivity is that exporters are more productive than non-exporters, and that the more productive firms self-select into export markets, while exporting does not necessarily improve productivity." To get past these sunk costs firms need to have sufficient capabilities of which there have been many studies including Bernard and Jensen (1999), whom using US firm data find that, "Exporters are, on average, bigger, more productive, more capital intensive and pay higher wages compared to none-exporters" or Roberts and Tybout (1997) who find for Colombian manufacturing plants that, "Results indicate that sunk costs are a significant source of export-market persistence, both observed and unobserved plant characteristics also contribute to an individual plant's export behaviour. Plants that are large, old, and owned by corporations are all more likely to export."

Melitz's (2003) trade theory, as previously mentioned, supposes that firms that are larger have more ability to absorb the costs of exporting based on the empirical finding that exporting firms tend to be more productive than non-exporters. This would be as exporting requires a certain level of investment as a fixed cost before exporting can be developed. Melitz's model (2003) shows that higher levels of productivity open opportunities to internationalise through exporting and perhaps FDI (an extension of Melitz's model from Helpman et. al. (2004)) to meet the sunk costs being able to be met by firms with higher levels of productivity. Here the assumption is that fixed costs of setting up an exporting relationship are high and from Helpman et. al. (2004) the fixed cost of FDI is at an even higher level. The most productive firms set up FDI, then the next most productive firm to participate in export markets, while less productive firms continue to serve the domestic market only. This is because the extra level of costs from exporting needs to be met. Another theoretical model comes from Bernard et al. (2003), "fitting the model to bilateral trade among the United States and 46 major trade partners, we go quite far in matching these facts quantitatively." They find that, "Our framework captures the stylized facts qualitatively, and goes quite far in matching data on U.S. manufacturing plants. The framework points to the importance of export costs in segmenting markets, and of

efficiency differences across producers in generating heterogeneity in market power, measured productivity, and the ability to overcome geographic barriers."

Productivity has been shown to be significant in several studies of which a few will be mentioned here. Farinas and Martın-Marcos (2007) use Spanish firm-level data to show that prior to entering an export market, new-entry exporters have a better performance than non-exporters, for example, using TFP (total factor productivity), "The evidence presented …..confirms that entering exporters have a higher TFP with respect to non-exporters. For the whole sample of firms, the TFP is 3.8 per cent higher for entering exporters than for non-exporters, and the difference is also significant for continuing exporters." They find that, "these results confirm that the magnitude of the productivity premium for exporters is robust to the measurement of technology with different methodologies, i.e. using either the parametric methods or the index number measures. A second pattern of results refers to productivity differences across industries. The evidence obtained suggests the existence of some degree of heterogeneity in the magnitude of the productivity differences." Lawless (2010) examining the trading patterns of individual Irish firms, find that, "Although there is little movement of firms into and out of exporting, firm's involvement in individual export markets is much more dynamic. Over one-third of firms change their market coverage, usually by entering or exiting one additional market. This is consistent with an interpretation here the bulk of any sunk cost encountered in exporting is incurred during the initial entry to the export market. Subsequent entry to additional markets may be made easier by prior export experience, which could help reduce the sunk cost of extending market coverage." Moxnes (2010) studying panel data from Norwegian manufacturing firms examines the differences between global costs of exporting and country specific costs and finds that, "I find a clear role for both types of costs, and country-specific costs are roughly three times the magnitude of global costs."

Within the UK, Greenaway and Kneller (2004) also find evidence of the role played by sunk entry costs, "Self selection takes place, with larger and more productive firms entering export markets, and firms have to become more productive to enter." The theory that productivity is needed for firms to export is extremely powerful and seems to be well founded theoretically and empirically, and is examined further more in Chapter 3.

2.2. Stages of internationalization

An important question is how and when firms start to internationalize. Jones and Coviello (2005) suggest that in order to achieve competitive advantages the understanding of timing is vital for successful internationalisation. A firm needs information on how to export (this is linked into the idea that the ability and knowledge to export is a cost), possibly gained through the experience of operating in the international market and knowledge incrementally. Alternatively, firms could decide to internationalize at a faster rate devoting all their resources to creating and supporting a market overseas. Johanson & Wiedersheim-Paul (1975) and Johanson & Vahlne (1977) theorise that as firms learn more about a certain market, they become more committed to it by investing more resources into that market. Firms gain experience in their domestic market and start exporting in a gradual process called the Uppsala model. Leonidou and Katsikeas (1996) on the basis of a comprehensive review of papers, found that export models are, "a number of fixed, sequential stages, although the number of stages varies considerably between models, ranging from as few as three to as many as six." They also identified three generic stages: the pre-export stage; the initial export stage, and the advanced export stage."

Figure 2.2: Johanson and Vahlne (1977) Internationalization model
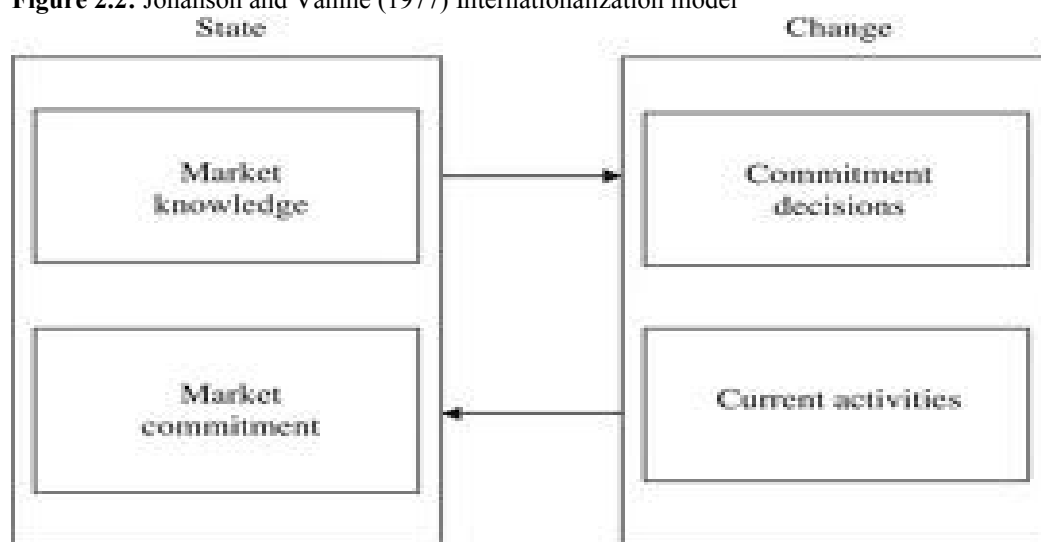
The Uppsala model theory of internationalization is that firms take the opportunities outside of their firm based on knowledge and experience of exporting. Initially firms operate in the vicinity of their existing knowledge and supply only to domestic markets. Slowly the firms go through the stages of learning and naturally in time go deeper into exporting via licensing then exporting and finally making use of FDI as the firms will have slowly grown resources and knowledge. This process will then become more intensive as

the knowledge of the foreign market is built up within the firm resulting into more extensive exporting operations.

This model also suggests which countries will be the first exported to: Vahlne and Wiedersheim-Paul (1973) suggest that firms will begin developing links to markets that have closer "psychic" distance to themselves. This means that countries which are further away might still have closer cultural or language or other similarities. The firms will expand to the closest countries culturally. This theory of psychic distance can be found in other papers, such as Kogut and Singh (1988) who study 228 entries into the US market, "We seek to explain differences in country propensities in the choice of entry modes from the point of departure that differences in cultures among countries influence the perception of managers regarding the costs and uncertainty of alternative modes of entry into foreign markets." Finding that, "In summary, the statistical estimations provide strong support that cultural distance and national attitudes towards uncertainty avoidance influence the choice of entry mode." Additionally, Nordstrom and Kleiner (1990) find that, "Getting into international markets requires the skill to understand the customs, values, sociology and historical perspectives of the people and their country. If the international managers can master these skills, then entering the country will be much easier. They will be able to establish contacts/associations with foreign business companies and enter into agreements which will help to smooth the difficulties of red tape and cultural diversity." Erramilli and Rao (1993) explain that, "When management moves to a country that is culturally similar to the home country, it may already possess most of the information to operate in the market hence; information-acquisition costs will be low. However, when management enters an unfamiliar foreign culture, it may have great difficulty in imposing subjective judgement to determine how people should behave and in evaluating hard-to-quantify inputs and results. As a general rule, information-acquisition costs and, therefore, integration costs, can be expected to increase with the increasing cultural distance of the host country."

More recent studies of the Uppsala theory include Bell et. al. (2003) who state that typically firms internationalise one market at a time and concentrate on a small number of key markets, adapting their existing goods and services to the needs of each new market. Jansonn and Sandberg (2008) studying SMEs in southern Sweden trading with the Baltic States, Poland and Russia, find that relationships are critical for entry as most firms rely on direct relationships with customers. This observation demonstrates the importance of building strong business networks to be successful in a market. Bypassing these stages

increases the risks of failure as there will not be enough information on how to export successfully. Eriksson et al., (1997) help define the types of information that firms need to export: "Experiential market knowledge pertains to two different aspects: business knowledge and institutional knowledge. By "foreign business knowledge" we mean experiential knowledge of clients, the market, and competitors." Foreign institutional knowledge refers to experiential knowledge of government,institutional framework,rules,norms,and values."

However, there are many studies of firms internationalizing earlier than predicted by the Uppsala including Oviatt and McDougall (1994) who give examples and term the phrase "international new ventures". Moen and Servais, (2002) studying SMEs firms from Norway, Denmark, and France, find that, "Export intensity, distribution, market selection, and global orientation are not influenced by the firm's year of establishment or first year of exporting activity. One-third of the firms sampled reported that the time period between establishment and export commencement was less than two years". Sapienza et al. (2006) in their critique of internationalisation theory argue that strategy is a major component of firm's international growth and does not preclude early exporters. "Our model suggests that, ceteris paribus, internationalization increases risks of failure but also increases opportunities for significant growth. For entrepreneurs whose goal is to create a venture that provides long-term self-employment, early inter nationalization is a risky choice. Of course, as we discuss below, internationalization may at times be the best choice to secure firm survival. We propose that internationalization improves the chances of building a venture of great potential. For some entrepreneurs, failing in one or many ventures before creating the "big winner" is not an impediment and may actually provide experience that improves the odds of future success and wealth." Forsgren (2002) argues that the Uppsala theory does not take into account effects such as that the acquisition of other firms which may speed up the internationalization process.

Johanson and Vahlne, (2009) revisit their Uppsala internationalization process model in the light of changes in business practices and theoretical advances that have been made since 1977. Now the business environment is viewed as a web of relationship, "Outsidership, in relation to the relevant network, more than psychic distance, is the root of uncertainty."

Figure 2.3: Johanson and Vahlne (2009). Updated internationalization model
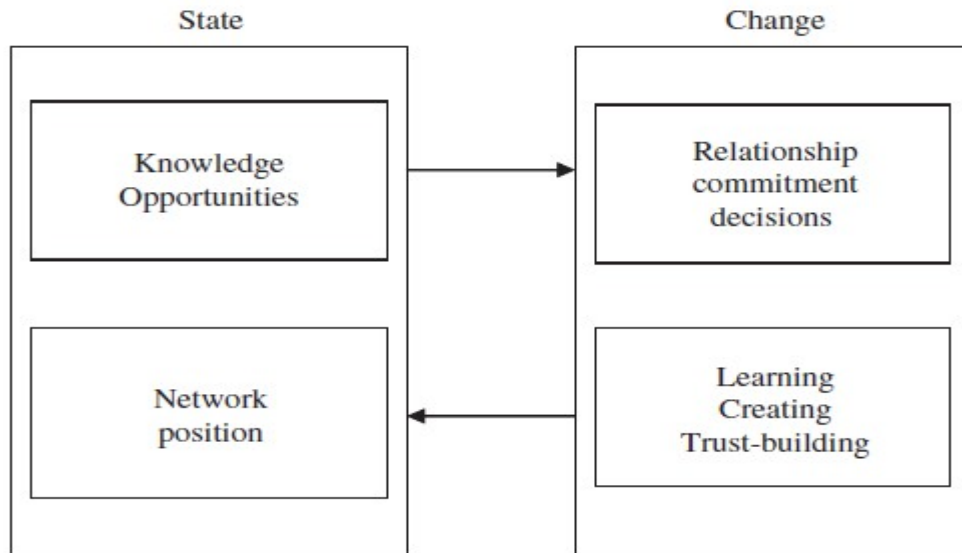
There seems to be a great deal of support for firms being able to export at different rates to under the Uppsala theory in different conditions. The path to internationalisation does not necessarily need to be incremental.

2.3. Born Global Firms

Axinn and Matthyssens (2002) argue that the Uppsala path of internationalisation, "was developed within a specific environmental context to explain a fairly specific set of observed firm behaviours". Shrader et al. (2000) examine 212 foreign market entries by 87 new ventures based in the United States. Their findings suggested that ventures managed strategic international risks by, "determining trade-offs among three risk factors: the economic and political riskiness of the country entered, the degree of commitment to the foreign location (indicated by the entry mode employed), and the percentage of foreign revenue exposure in that country." Oviatt and McDougall (1994) identified an international new venture as, "a business organization that, from inception, seeks to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries." Knight and Cavusgil (1996), define born global firms as, "small, technology oriented companies that operate in international markets from the earliest days of their

establishment." Autio et al. (2000) argue that born-global firms can internationalize quickly because of a lower degree of organisational inertia they propose that, "as firms get older, they develop learning impediments that hamper their ability to success-fully grow in new environments and that the relative flexibility of newer firms allows them to rapidly learn the competencies necessary to pursue continued growth in foreign markets."

Rialp et. al (2005) summarise the which factors might encourage firms to be born global:

(a) a managerial global vision from inception;

(b) high degree of previous international experience on behalf of managers;

(c) management commitment;

(d) strong use of personal and business networks ;

(e) market knowledge and market commitment;

(f) unique intangible assets based on knowledge management;

(g) leading-edge technology products, technological innovativeness

(h) a niche-focused, proactive international strategy in geographically spread lead markets around the world from the very beginning;

(i) narrowly defined customer groups with strong customer orientation and close customer relationships;

(j) flexibility to adapt to rapidly changing external conditions and circumstances.

Freeman et al. (2006) suggest that SMEs do not focus on their domestic markets before internationalizing. A typical path for a born-global firm is suggested by Freeman and Cavusgil (2010) with born-global firms, "displaying periods of early, accelerated outward growth, sometimes followed by a return to the home market before further rapid foreign expansion". Johanson & Mattson, (1988), Freeman and Cavusgil (2007), Nordman and Melen (2008), all argue that membership in a network might provide the ability to acquire knowledge to internationalise faster.

2.4. <u>Network theory of internationalisation</u>

The Uppsala method has at its core the idea that knowledge of exporting and markets is built up slowly, but another way of gaining the ability to export and allowing quicker internationalisation such as exporting would be through a network. The network theory of internationalisation from Johanson and Mattsson (1988), allows for the influence of external actors or organisations on the internationalisation of the firm, as the firm can use resources that are controlled by other firms in the network that they would otherwise have to develop themselves. Johanson and Mattson (1988) and others suggest that networking explains how small firms who would have high costs can internationalise. Freeman & Cavusgil (2007) shows that networks provide firms with access to international market opportunities and influence which foreign markets are chosen for entry. The importance of networking is in many other papers, such as Coviello and Munro (1995) using various case studies and a mail survey in Coviello and Munro (1997), while Jones (2001) suggests the importance of networks to new firms "Small firms are likely to grow, at least at the beginning of their existence, through the establishment of links with the external environment". Harris and Wheeler (2005) considers in detail the importance of inter-personal relationships in the internationalisation process for SMEs, finding that some of the relationships formed do not just "fulfil a marketing function". Their case studies show that, "First, some of the international relationships that entrepreneurs form do not just fulfil a marketing function, give information, or yield access to networks. For these entrepreneurs, the relationships do much more, they direct strategy, and can transform the firm. They can be regarded as these firms' most important assets. Second, the relationships rarely originate within customer, supplier or distributor firms. They can come from anywhere, in work or social settings. We know from previous research that social interaction is very important. These relationships need to mature and develop into trusted inter-personal relationships, and this is done through extensive social interaction."

Networking within and outside the SME network enhances firm's performance, such as in Fuller-Love and Thomas (2004) where, "Co-operative and networking strategies amongst business in Mid Wales has brought them many benefits and a competitive advantage that they would not be able to afford on their own. These issues were investigated in this research into the practical value of networks in small manufacturing companies. The small manufacturing businesses in this study saw that networking was a very cost-effective way compared to other strategies to improve their performance. The businesses co-operate in order to share information and resources and to undertake joint projects. By exchanging

information and know-how, networks can be an important tool. The businesses work together towards a common goal by sharing information and resources in order to undertake joint projects. By exchanging information and know-how cooperation between networks can help businesses to co-operate or receive information from outside the business in a less costly way than the other methods."

Similarly, Freeman et al. (2006) found that many smaller born-global firms, with limited competencies, entered foreign markets by forming strategic partnerships and taking advantage of the marketing capabilities and local knowledge of their network partners. Strength of the ties across the network which is important but weak ties also gives benefits. Levin and Cross, (2004) investigating networks found, "First, the link between strong ties and receipt of useful knowledge (as reported by the knowledge seeker) was mediated by competence and benevolence-based trust. A weak tie is structurally beneficial because it is more likely than a strong tie to provide non-redundant information."

Freeman et al. (2006) states that supply chains are regarded as important networks for rapidly internationalising born-global firms, finding that, "The key constraints identified in extant literature and confirmed in our analysis are not unusual to small firms. Both large and small firms engaged in internationalisation are likely to face some or all of these constraints, but managers in smaller born-global firms respond by developing strategies that allow them to expand rapidly into international markets while sharing resources and the risks. Each strategy is strongly related to networks, and these business networks are derived from personal networks that have taken a long time to develop, suggesting that a network perspective is a major theoretical underpinning." Schweizer et al. (2010) believe that often internationalisation should be seen as either a by-product of a firm's efforts to improve its position within a network, "If internationalisation occurs, it is because of relevant contextual factors, such as whether a partner, actual or potential, is located across a national border. This is more likely to occur in smaller countries. It is also more frequent in industries characterized by advanced technology. Such industries are closely networked global communities." Musteen et al. (2013) studying SMEs in the Czech Republic, found that, "firms with chief executive officers who had developed strong and diverse international networks exhibited greater knowledge of foreign markets prior to internationalisation..…demonstrating that SMEs in transition economies benefit significantly from diverse and strong network ties via increased knowledge of foreign markets and improved performance in such markets."

However, in contrast, it could be the case that where networks assist in providing information, the transfer and application of this information may not be easy as the firms may lack the skills to absorb the knowledge of the firms they network with.

2.5. <u>Resource based view</u>

The resource based view (RBV) is attributed most closely with Barney (1991), which suggests that a firm can earn above average returns if and only if it has superior resources. To succeed a firm needs a sustained competitive advantage through, "absorbing and applying valuable, rare, inimitable, and non-substitutable resources and capabilities."

Barney (1991) explains firm's resources as, "all assets, capabilities, organizational processes, firm attributes, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" or anything that "are valuable when they enable a firm to conceive of or implement strategies that improve its efficiency or effectiveness." Galbreath (2005) examine the value of the important resources in RBV testing the theory on a sample of manufacturing and services firms operating in Australia, dividing the types of resources into: "Tangible resources which include (a) financial assets and (b) physical assets. Intangible resources that are assets include (a) intellectual property assets (b) organizational assets and (c) reputational assets." They find that, "Our study found that those resources that are intangible in nature do, in general, impact more significantly on firm success than those resources that are tangible in nature."

Rodriguez and Rodriguez (2005) indicate that technological resources can generate firm advantages such as via the development of new and more efficient production processes, "the resources and capabilities that add value to the firm, do not have strategic substitutes and above all are either inimitable or difficult to imitate. Among these strategic resources the intangible ones stand out—those that by their very nature most easily fulfil the requirements for resources to generate sustainable competitive advantages. Among intangible resources, technological resources are particularly significant; these provide the firm with an innovative capacity (for products and/or processes) and are important for the creation of competitive advantages, especially competitive advantages based on differentiation which give a firm a superior competitiveness to act in international and global markets."

One of most recent UK studies examining the RBV of firms comes from Beleska-Spasova et al. (2012) with a structural equation modelling approach on a sample of 356 British exporters and they find that, "four resources/capabilities: managerial, knowledge, planning, and technology, have a significant positive direct effect on export performance, while relational and physical resources exhibited no unique positive effect."

2.6. Innovation

Moving on from the resource based view it is important to identify how firms can generate new resources, such as with innovation. Vernon's (1966) product cycle is one of the earliest innovation and exporting related models. Vernon's example is that particular products will be made in the USA or other more developed markets first and will then be exported to the areas that have not yet developed these products. The innovation of more developed products has led to a competitive advantage of these products over less developed markets. Another key innovation theory comes from the technology gap theory of trade, the Krugman (1979) model of international trade in which the pattern of trade is determined by a continuing process of innovation and technology transfer. The model uses, "a innovating north and non-innovating South. Innovation takes the form of the introduction of new products which can be produced immediately in North but only after a lag in South. The lag in adoption of new technology by South is what gives rise to trade." By undertaking innovation in the North there is a direct link to exporting.

Generally there are many theories that agree that innovation might lead to exporting. McDougall et al. (2003) explain how innovation can improve firms, particularly international new ventures or born-globals, as possession of unique knowledge provides a foundation for competitive differentiation and competition abroad. Many studies find innovation (using different measures including R&D expenditure, R&D expenditures as an indirect measure of innovations or measures of human capital) to have a strong effect on exporting. For example, Wagner (2007a) studying a sample of German firms finds, "between 40 and 45 percent of the large difference in the share of exporting firms in West and East Germany can be explained by the higher human capital intensity and – to a less degree – by the larger average size of West German firms." Wakelin (1998) uses UK data, finding a complicated relationship between exporting, "One of the main results to emerge from the analysis is that innovating and non-innovating firms behave differently both in terms of the probability of exporting and the level of exports. This implies that the capacity to innovate fundamentally changes the behaviour of the firm. Given their size, innovating

firms are less likely to enter export markets than non-innovating firms, as shown by the descriptive statistics and the sign on the dummy variable for being an innovator. Large innovative firms are likely to export, and the more innovations they have had, the higher the probability that they will enter export markets." Others are mentioned in more detail in the next chapter.

2.7. <u>Eclectic paradigm</u>

Dunning (2009) "for much of the last two decades...the theory of internalization...has been the dominant explanation of the existence and growth of the MNE" referring to the eclectic paradigm developed by Dunning himself (1977). This eclectic paradigm framework uses the three firm advantages of ownership (O), location (L) and internalization (I) to explain the internationalization processes of firms. Ownership advantages referred to the production process, such as, "competitive advantage over domestic firms, and include patents, technical knowledge, management skills and reputation are having various tangible and intangible assets such as patented technology, brand names, refers to strengths in coordinating – and taking advantage of operating – a network of geographically dispersed affiliates." Location advantages could include: "access to protected markets, favourable tax treatments, lower production and transport costs, lower risk and favourable structure of competition, in terms of natural resources, factors of production, demand conditions (low-cost semi-skilled labour or rich natural resources may attract investments that specifically aim to exploit arbitrage opportunities." Internalisation advantages refer to, "benefits of creating, transferring, deploying, recombining and exploiting FSAs internally instead of via contractual arrangements with outside parties. Internalisation occurred due to the public good nature of ownership advantages and – compared with licensing or exporting – had the advantage of lowering transaction costs, minimizing technology imitation and maintaining the firm's reputation through effective management and quality control."

2.8. <u>Oligopolistic reaction</u>

Reaction theory is where firms make part of their decisions based on those of other firms and so could be led into exporting due to the actions of others. Knicerbocker (1973) theorises that firms naturally followed other firms based on the different type of market structure that they were in. In an oligopoly, for example, the firms might decide to export to constrain the other competitors or alternatively they may prefer not to compete with each other due to the higher cost of competing in a market with more competition. Karnani and Wernerfelt, (1985) suggest that firms will react in a way to actively show that they are prepared to be aggressive to one another if not actually wanting to export. "Multiple point competition, which can be defined as a situation where firms compete against each other simultaneously in several markets. A common example of multiple point competition is firms competing against each other in different geographical markets for the same product." A mutual foothold equilibrium is typically more costly (that is, both the firms are less profitable) and requires less trust between the two firms than a limited war equilibrium, which in turn is more costly and requires less trust than keeping total peace (i.e. market sharing). However, a limited war only rarely offers enough disciplinary leverage to produce a stable equilibrium. Thus, in situations where the firms are far from having developed mutual understanding and communication, mutual foothold equilibrium may be the only way to prevent total war, especially if an attack offers big first mover advantages." In essence a firm could decide to become an exporter to constrain a rival and help provide some protection against aggression in the domestic market.

More recently, Rose and Ito (2002) studied the tire industry to attempt to find such an effect by examining the market positions of tyre companies, finding that that the presence of more international oligopolistic competitor is associated with a higher probability of a firm's presence in a market. Lawless and Whelan (2008) finds that there is no oligopolistic reaction but the circumstances are changed in the domestic market by the number or strength of the competitors. Clougherty and Zang (2008) explain the national-champion rationale whereby firms who have large domestic operations can take advantage of economies, which allow them to earn large shares and profits in export markets. Wiersema & Bowen (2008) suggests that domestic competition encourages firms to seek opportunities abroad, as the higher the industry rivalry, the smaller the profit margins in the home market and the higher the likelihood of a firm to expand and to look for opportunities in foreign markets.

3. <u>Summary of theoretical determinants of exporting</u>

Briefly in the introduction, the variables that effecting exporting status of a firm where mentioned and the theories that might affect a firm's ability to export where given in chapter 2. Economic theory and empirical testing has suggested which variables might effect exporting. Often different variables have been found to be significant in different models done at different times in different countries. Firstly, region will be examined, then the effect of trade unions, size and labour productivity, industry, imports, age of the firm, export destinations, barriers to exporting, previous exporting experience, innovation, e-commerce, subsidies, foreign ownerships and distance to the border. Mentioned here are some of the key papers and for the UK, including Harris and Li (2011) which is amongst the most recent study of the determinants of exporting in the UK. Based on this information there are the following hypotheses:

3.1. <u>Region/Countries</u>

Regions of different countries or different countries themselves might have different characteristics which could affect exporting, both directly through ease of exporting due to transport links, and indirectly through effects such as agglomeration with a larger or more export orientated pool of workers to choose from. Greenaway and Kneller (2008) found that, "co-location of other export firms in the same industry and region significantly increases the probability of export market entry." There are spillover (indirect) effects of knowledge on how to export from working in close proximity to other exporters. The more concentrated the export activity in a particular area, the easier a firm should find it to export. Firms may decide to agglomerate in a particular area due to good infrastructure with better airports, ports and roads. Also there are spillover effects of knowledge on how to export from working in close proximity to other exporters. The more concentrated the export activity in a particular area, the easier a firm should find it to export. Overman et al. (2003) explain that firms developing within the same region knowledge transfer from one to another. This technology transfer could reduce the cost of gaining the knowledge to export so that locating in certain areas should allow firms to export more easily.

The type of sector that a firm works could be important due to differing fixed costs that act as a barrier to exporting. Exporting patterns can be different in different sectors as the design and product cycle could vary significantly.

The evidence for regions being significant is conflicting. Using data on Mexican manufacturing plants, Aitken et al. (1997) found probability that Mexican plants export positively linked to the presence of multinational firms in the same state. "The export decision of domestic plants appears to be positively correlated with the local concentration of MNE activity, regardless of whether MNEs serve local or export markets. This suggests that proximity to MNEs, in general, provides domestic plants with access to foreign markets. One possibility is that domestic firms do not learn from the specific production activities of MNEs but benefit from general linkages that MNEs maintain with parent firms, or other firms, abroad. Another possibility is that the positive correlation between the probability a plant exports and MNE domestic production is merely a by-product of the statistical correlation between MNE export activity and MNE domestic production." Bernard and Jensen (2004) using USA data found that that there was no significant effect of spillovers, "In defining proximity to a plant for spillovers, we consider both the roles of geography and industry. As discussed above, we run two specifications, one based on the number of plants and another based on the quantity of exports. Surprisingly, most of the spillover measures have negative coefficients. The only exception is on state spillovers using the plant measure, and that is not significant. State-industry exporters and industry exports are negative and significant, suggesting that existing export activity may inhibit entry into exporting."

Koenig et al. (2010) investigates the impact of exporters' agglomeration on the export behaviour. of firms, using data on French exports for 1998–2003, finding that local exporters in the same industry influences positively the volume of exports to a given country. "With the inclusion of controls, results show a distinct effect of exporters' agglomeration on the intensive and extensive margins of trade. The number of product-country specific exporters in a given area positively affects the export decision of a firm; however, it does not seem to have an effect on the volume exported by the firm. Spillovers on the export decision are stronger when specific, by product and destination." Most recently studying UK firms, Harris and Li (2011) studying exporting and R&D in the UK for 2004, found that regions within the UK determine exporting propensity.

3.2. Trade area

Being part of a trade union such as the Euro could affect the ability of firm's to export as there are more links and less regulation when exporting to other members of the trade union and the links through institutions leads to a greater degree of connection between countries. For the European Monetary Union, Dell'Ariccia (1999) analyses the effects of exchange rate volatility on bilateral trade flows using a gravity model and panel data from Western Europe, exchange rate uncertainty is found to have a negative effect on international trade. They point out that, "The EMU might have a different impact across industries. In sectors where the export activity requires large investments, trade should prove more sensitive to exchange rate volatility than in sectors characterized by short-term exports." If countries have the same currency such as the Euro this might lead to less risk and so increase the propensity to export.

Other papers have investigated these effects such as Rose and van Wincoop (2001) who finds that the effect of EMU on trade is positive and economically important. Berthou and Fontagne (2008) use French firm level data from (1998–2003) to analyse the micro effects of the Euro finding that it increases the number of products traded. Baldwin et al. (2008) also provide descriptive statistics using firm-level Belgian data showing the existence of a pro-trade effect of the Euro. Glick and Rose (2002) use a 1948 to 1997 sample, that includes a number of countries that left currency unions during that period, find that trade among the members was twice as high in the currency union period.

3.3. Size/ productivity

Size and productivity of a firm can affect the ability to export. This could be as they have advantages of scale that make them more productive and may also have the capabilities and abilities to start exporting much more easily. As previously mentioned Melitz (2003) creates a model showing that more productive firms should export. Costantini and Melitz (2007) model predicts that firms should enter export markets based on productivity, with more productive firms more likely to be able to cover trade costs and enter export markets. Only the most productive firms are able to enter the least popular markets. These models also predict that export sales depend positively on productivity. Clerides et al. (1998) analyses Colombian, Mexican, and Moroccan producers, finding that, "relatively efficient firms become exporters; however, in most industries, firms' costs are not affected by previous exporting activities. So the well-documented positive association between

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exporting and efficiency is explained by the self-selection of the more efficient firms into the export market." and "Thus, with some possible exceptions, the association between exporting and efficiency is most plausibly explained as low-cost producers choosing to become exporters."

Bernard and Jensen (2004) state, "Size may proxy for several effects; larger firms by definition have been successful in the past, but size may be associated with lower average, or marginal, costs, providing a separate mechanism for size to increase the likelihood of exporting. We use productivity, measured by total factor productivity, as an additional measure of plant success." Using a sample of U.S. manufacturing plants between 1984 and 1992 one of their results is that, "Large, productive plants have higher probabilities of exporting." While their conclusion is that, "The major results are that entry costs are significant for U.S. plants and plant heterogeneity is substantial and important in the export decision." Wakelin (1998) suggests that it might be particularly important if there are fixed costs to exporting such as information gathering or economies of production and/or marketing which may benefit larger firms disproportionately. "It is possible that a minimum size is required to overcome the additional costs of exporting, beyond which increases in size have no impact on export behaviour." Also she find that, "Although size is an advantage in exporting, this may not apply to very large firms which can be more orientated towards the domestic market due to, for example, a domestic monopoly giving them no incentive to export." Arnold and Hussinger (2005) examined the relationship between productivity and exporting in German manufacturing industry, finding that high productivity has positive impact on exporting.

Alternatively on the other hand, smaller firms may not have such a problem exporting; Bonaccorsi (1992) based on a survey of the Italian manufacturing industry argues that small firms can obtain the necessary resources either by the vertical integration of export functions or by access to external resources. "Due to low entry barriers in export activity, to easily accessible information on foreign markets and on the basis of an imitative behaviour., small firms reduce their export risk perception and make the decision to export." There are other ways for small firms to gain access to resources: Holmlund and Kock (1998) studying Finnish SMEs find that social networks of small and medium-sized firms significantly affect the internationalization process of smaller firms.

Indirectly large firms may have different behaviour such as using FDI instead of export as the theory of Melitz (2003) predicts. This is because FDI might require advantages in

productivity and other capabilities and firms might prefer FDI as a strategy to exporting due to cost advantages. Wagner (2001) finds an inverse U-shape pattern of the effect in Germany presumably with smaller firms not being able to absorb the costs of exporting, while larger firms can absorb the costs of FDI as predicted by Helpman et al. (2004). Kalafsky (2004) examined SMEs in the United States machine tool sector and found that firm size is not correlated with export-intensity or export growth.

Within the UK most recently from Harris and Li (2011) studying the UK firm level data in (2004) created several models on the determinants of exporting. For the model for manufacturing firms they found that, "the size of the establishment had a major impact on whether any exporting took place; vis-à-vis the baseline group (establishments employing less than 20), moving to 20–49 employees increased the probability of exporting by 8.4%; while having 50–199 workers increased the probability by 13.1%." Again for the model for manufacturing firms they found that "Establishments with higher labour productivity were also more likely to enter export markets; a doubling of this variable (from its mean value of just over £68k turnover per worker) increased the probability of exporting by nearly 8%."

3.4. Industry

Being in a particular industry may mean that there are direct effects such as the nature of the product or service meaning that it is easier or more likely to export. Contractor et al. (2007) studying Indian firms conclude, "that the barriers to internationalisation are lower for service firms, and especially for knowledge-intensive service firms, than for manufacturing enterprises". There may be other indirect effects such as the characteristics of the industry; being in an industry that has high levels of innovation may in turn increase the likelihood of exporting. Wiedersheim-Paul et al. (1978) argue that companies producing bulky or perishable products were assumed to view foreign operations with reluctance.

Zeithaml et al. (1985) list the differences between services and manufactured goods:
(A) intangibility (services are not transportable or storable),
(B) inseparability (production and consumption occur simultaneously),
 (C) perish ability (services cannot be saved but must be consumed as they are produced),
(D) heterogeneity (services are unique and difficult to standardize)

This may mean differences in the ability to export, for example, Contractor et al. (2007) find that after studying the internationalization path and profitability of 269 Indian companies, over a 5-year period that, "the barriers to internationalisation are lower for service firms, especially for knowledge-intensive service firms, than for manufacturing enterprises."

There are possibly indirect effects, with Greenaway et al. (2004) finding that for 1992–96 the presence of multinational firms in the industry sector positively affects the decision to export and the export ratio. Requena and Castillo (2007) find that the probability of exporting to a specific destination by new exporters is positively linked to the presence of nearby exporters from the same industry. The proportion of exporters in the composition of the industry/services sector may affect the likelihood of exporting due to spillovers of knowledge. Bleaney and Wakelin (2002) find that firms are much more likely to export if they are located in a sector with a high level of R&D intensity. As mentioned previously in section 3.1, Koenig et al (2010) finds that the number of local exporters in the same industry influences positively the volume of exports to a given country. On the other hand, Bernard and Jensen (2004) find no role for spillovers from nearby exporters or from same industry exporters,

Within the UK most recently, Harris and Li (2011) find, "As far as the market or industry is concerned, the results ….indicate that industry/market concentration and agglomeration were both linked to a greater probability of exporting. Sector also mattered; those with the highest propensities to export were (ceteris paribus) chemicals, basic metals and machinery and equipment."

3.5. Imports

Importing could improve firm's products as different types of inputs could add uniqueness and variety to the goods and services. Indirectly, importing could help firms to export as there may be more links with foreign countries. There has been a great deal of work to on the indirect ways imports can improve a firm .A positive link between firm productivity and imports is found in Halpern et al. (2009) for Hungarian firms; Muuls and Pisu (2009) for Belgian firms; Vogel and Wagner (2010) for German firms, research has also found evidence that imported intermediates increase product innovation. Kugler and Verhoogen (2009) find that imports improve quality of products. There are theoretical reasons to expect that imports of inputs will impact upon firms productivity levels. More inputs from other countries may increase the variety of inputs, Feenstra et al. (1992) show that an increase in input variety is positively correlated with total factor productivity (TFP).

Gibson and Graciano (2011) argue that the benefit of using imported inputs lies in a combination of the relative price and the technology embodied in the inputs, which leads to an increase in price competitiveness and non-price competitiveness of importers compared to firms that do not import. Bas and Strauss-Kahn (2011) study the impact of imported inputs on the margins of exports for French firms during 1995-2005, finding that there is a significant impact of higher diversification and increased number of imported inputs varieties on firm's TFP and export scope.

Furthermore, for the direct effects of importing on exporting, Lo Turco and Maggioni (2013) find that, "We confirm that exporting and importing are two importantly interrelated strategies, and, when accounting for productivity and export sunk costs, we find that only imports from cheap labour countries positively and significantly affect the export probability of Italian manufacturing firms." Higher shares of imports from low-income countries, has positive effect on the propensity to export of Italian firms, while imports from high-income countries have no effect. David Aristei et al (2013) using firm-level data for a group of 27 Eastern European and Central Asian countries over the period 2002–2008 find that importing has a positive effect on exporting.

3.6. Age of firm

There are different beliefs about the stages that a firm needs to go through to be an exporter. The Uppsala internationalization theory such as Johanson and Vahlne (1977) emphasizes that the distinct knowledge and competencies typically related to product adaptation, marketing and distribution that are required for export success. The older the firm the more established it might be having better resources to allow it to export. It is also might pick up effects such as the firm having a sufficiently developed product or saturated demand in the domestic market.

A firm may need years to build up sufficient motivation and ability to export if there is an incremental exporting effect. There is also an element of which firms make the best exporters. The older the firm, the more established it might be, having better resources to allow it to export. It is also might pick up effects such as the firm having a sufficiently developed product or saturated demand in the domestic market. Therefore there are expectations that older more established firms are more likely to export than younger firms that are recently formed. Majocchi et al. (2005) studies Italian SMEs manufacturing firms for 1997–2001. Their results show that "it is not business experience per se which is important but that it is the relative change in experience that truly impacts upon export performance. Showing that, for manufacturing firms, industry experience is an important variable and that the relationship between age and export performance is positive. Firstly, our data shows that the relationship between age and export performance is not a linear one and that that it is the relative experience of firms that matters and not just age. These results can be explained referring to the need for firms to develop an international network of partners and customers."

On the other hand there are many papers that show incremental effects, with older firms having increased propensity to export. Roberts and Tybout (1997) studying Colombian manufacturing plants find older firms performing better in exports sector. However, Bhaduri and Ray (2004), in case of Indian Electronics/Electrical industry find that the younger firms with latest equipments and technology have an edge over older firms in export market.

Within the UK most recently, Harris and Li (2012) find a small positive effect on the propensity to export for older firms.

3.7. Export destinations

There are potentially differences in how easy it is to export to different locations, due to the feedbacks and the potential differences between the costs of different export destinations. Studying Belgian firms Pisu (2008) finds that, "sunk costs of exports may be country-specific and larger in advanced and sophisticated markets". Some countries may be more likely exporting destinations due to psychic cost as previously mentioned and different destinations may also have different sunk costs of exporting. This sunk cost may be different in areas where firms have links to other locations, for example, Requena and Castillo (2007) find that, "the probability of exporting to a specific destination by new exporters is positively linked to the presence of nearby exporters from the same industry. Spanish firms that started to export to at least one of 95 countries over the 2000-2006 period evidence of information spillovers, i.e. new exporters acquire valuable information from other local firms on foreign consumer tastes, product standards or customs administration in a particular market." Blanes-Christobal et al. (2008) investigate the importance of the region specific sunk export costs at during 1990–2002 for Spanish firms, the sunk exporting costs differed depending on the destination market.

Additionally, Melitz and Ottaviano (2008) posit that incentives to export are determined by destination market characteristics (e.g., market size and distance from the home market). These models imply a hierarchy of potential destinations, low productivity firms choose to enter only the easier or more attractive markets while more productive firms export to a wider range of destinations. Chaney (2011) suggests that market entry is driven by,"the accumulation of trading contacts, through a combination of 'random encounters' (or purposive attempts to seek out new markets) and the expansion of existing networks as firms expand their own network to include the contacts of their existing contacts." This means for the firm each country will have a different cost of exporting.

3.8. Barriers to exporting/ Financial constraints

Export barriers are the barriers preventing firms from exporting, many studies have found that they are highly important to firm's decision and ability to export, with Leonidou (2004) reviewing 32 empirical studies on the subject as it pertains to SMEs, finding that, "Smaller-sized firm's path to internationalization is not trouble free but is beset by many obstacles of variable severity and significance. Some of these obstacles are associated with internal weaknesses (for example, shortage of working capital), while others relate to

external factors (as in the case of different customer habits). Moreover, there are also problems that arise within the domestic sphere of the exporter (for example, lack of government assistance/incentives) and others that occur in the foreign market where the company operates or is planning to operate (such as keen competition). In general, internal barriers found within the country base of the exporting firm are more controllable and are easier to manage, as opposed to external problems occurring abroad." There are some barriers that the firms may find insurmountable, "certain barriers (such as those pertaining to information inefficiencies, price competitiveness, foreign customer habits, and politico economic hurdles) have a systematically strong obstructing effect on the export behaviour. of small firms."

Export barriers have been classified in different ways, Pinho and Martins (2010) classify export barriers including with resources, managerial, marketing, the knowledge-related constraints, the lack of knowledge of potential markets and the lack of technical suitability." In summary, results from the study revealed that non-exporters consider the lack of knowledge of potential markets, lack of qualified export personnel, lack of technical suitability, degree of competition in the sector, lack of financial assistance (governmental and financial institutions), and lack of qualified human resources as the main export barriers. By comparison, exporters perceived warehousing and control of the physical product flow in the target market to be the biggest barrier." Hutchinson et al (2009) studying small retailers based in the UK found that the firms perceived their barriers managerial-related barriers as aspects, such as the focus, ambition, commitment, and effort towards internationalization.

Barriers include capacity, cost, and availability of labour skills; working capital financing, securing export credit, and obtaining adequate insurance; and many others. For example, Chaney (2005) develops Melitz' model by adding liquidity constraints as a second source of firm heterogeneity, predicting that financial constraints may affect foreign market entry depending on the distribution of productivity and liquidity across firms. This is supported by other papers, such as Das et al. (2007) that estimate that for Colombian exporters, the average entry costs to exporting can only be met by firms with sufficient liquidity. This means that financial markets are crucial for firms' export activity, for example, Muûls (2008) finds that Belgian firms with lower credit worthiness are less likely to export, and if they do export they sell less abroad. Berman and Héricourt (2010) analyse a sample of firms in developing and emerging economies and capture firms' liquidity needs with balance-sheet variables. Their results reveal that better financial health promotes entry into

the export market but has no impact on the volume of foreign sales. Additionally, the importance of financing constraints for foreign markets entry decision is shown by Campa and Shaver (2002) for Spanish manufacturing firms, and Bellone, et al. Schiavo (2010) for Italian firms.

However, Stiebale (2011) empirically analyses French manufacturing firms over the years 1998–2005 finding that, "Although financial indicators are significantly correlated with export status and export share, there is no evidence that financial constraints have a direct impact on foreign market participation or sales in foreign markets". Greenaway et al. (2007) find no evidence that firms with better financial health are more likely to start exporting, while they obtain evidence that the participation in export markets improves firms' financial health. Using firm-level accounting measures of liquidity constraints they show that, "financial health is more an outcome rather than a determinant of entry into exports" based on their sample of UK manufacturing firms. Other papers agree that finance might not be so strong a barrier. Lancheros and Demirel (2012) studying the Indian service industry is that finance is not a significant determinant of exporting activity. "Access to external finance might have an impact on exporting only if service firms use the funds to develop their productive and technological capabilities."

Recently in the UK, Kneller and Pisu (2011) researched UK firms in 2005 and find that barriers to exporting are important. These included, "Identifying the first contact and marketing costs initial dialogue with prospective clients and partners and building relationships with key influencers and decision-makers. For other barriers, such as language, obtaining basic information about foreign markets, and dealing with legal, financial and tax regulation overseas, the probability of facing them is lower and declines further with the number of years of export market experience."

3.9. Previous exporting

Having previous experience suggests that the firm has had the ability to export and also has had the motivation to export in the past. Therefore firms with the knowledge to export will be able to export more easily and potentially this experience may allow the firm to export to a higher level of intensity. Bernard & Jensen (2004) explain that firms that have already invested in exporting knowledge have already spent money on the sunk entry costs to gain that knowledge. Therefore these firms should be more likely to export as they have an easier path towards exporting.

Management experience is part of the absorptive capacity of the firm and management is part of the behaviour of the firm. Managers who have high abilities may find it easier to export, also managers who have taken part in exporting previously may be more likely to use it again.. Leonidou et al. (1998) suggest that entrepreneurs who travel abroad are more likely to learn about foreign business practices, meet prospective clients, and identify market opportunities. Manolova et al. (2002) finds that amount of time the entrepreneur has spent living, working, or travelling abroad should increase their international orientation to foreign cultures and countries.

Furthermore, Alvarez et al. (2008), examining Chilean firms, finds evidence that exporting a product to a country increases the likelihood of selling the same product to another foreign market. Crick and Spence (2005) found in their study of 12 high-tech UK SMEs that networks developed previously by the firms' owner/managers were important in determining the internationalisation strategy of these firms. They also found that the network of contacts, "improved the availability and use of existing contacts, the development and use of resources and serendipitous encounters." Hambrick & Mason (1984) explain the upper echelons theory whereby, "executives' observable experiences determine their orientation, and therefore their strategic choices to some extent reflect the experiences and idiosyncrasies of decision makers, such as tenure, age, educational level, functional background, and international experience."

3.10. <u>Innovation</u>

Firms can follow different innovation paths, such as improving the products and services for competitive advantages that allow a firm to perform better internationally, with an improved or cheaper product. Besides developing new products, manufacturing firms can also develop new product-related services, introduce innovative manufacturing technologies or implement innovative organizational concepts. Each of these innovation types can be a source of competitive advantage in itself. Investment in product innovation may therefore be the key to explaining a firm's productivity and decision to enter a market. Firms need the organizational capacity and "absorptive capacity" as suggested by Cohen and Levinthal (1990) to change to a different mode of operation such as exporting. Constantini and Melitz (2007) construct a model that shows that anticipation of trade liberalisation may cause a firm to bring forward the decision to innovate in order to 'dress up' for future participation in the export.

Love and Roper (2001) studying UK ,German and Irish firms, find that plants within-house R&D capability are more likely to export and that networking and innovation are close complements as means to gain knowledge. Love and Roper (2002) studying UK and German firms find that firms that undertake product innovation are more likely to export. Gourlay et al. (2005) study UK service firms for the period 1988 to 2001 and find that R&D intensity has strong positive effect on both the probability and intensity of exporting. Additionally, Lachenmaier and Wößmann (2006) find that causation runs from innovation or R&D to exporting, "We test empirically whether innovation causes exports using a uniquely rich German micro dataset. Our instrumental-variable strategy identifies variation in innovative activity that is caused by specific impulses and obstacles reported by the firms, which can reasonably be viewed as exogenous to firms' export performance. We find that innovation attributable to this variation leads to an increase of roughly seven percentage points in the export share of German manufacturing firms." Lileeva and Trefler (2010) find evidence at the firm level that exporting is correlated with firm investment in R&D and innovation, while others such as Cassiman et al. (2010) find for a sample of Spanish firms that engaging in product innovation significantly increases the probability to start exporting, "Using a panel of Spanish manufacturing firms we find strong evidence that product innovation – and not process innovation – affects productivity and induces small non-exporting firms to enter the export market.". Bleaney and Wakelin (2002) for UK manufacturing find UK manufacturing firms for a period of five years from 1988 to 1992 significant differences in terms of R&D expenditures firms that export have much higher levels. "Innovating firms are more likely to be exporters if they have had more innovations; non-innovating firms are more likely to be exporters if they have lower unit labour costs. For non-innovating firms this is consistent with the prediction of the fixed-cost model that only the more efficient firms find exporting profitable. For innovating firms it suggests that the ability to innovate is a crucial dimension of competitive performance, perhaps because these firms operate in an environment of considerable product differentiation." Gourlay and Seaton (2004), for the UK, "Innovation is found to be crucial for entering export markets and extending market penetration, confirming the important role of technological factors and proprietary assets."; Baldwin and Gu (2004) for Canadian firms find that ."Exporters are more innovative than non-exporters both before and after they entered the export market.".

However, Damijan et al. (2008) used data on Slovenian firms in 1996-2002 and finds no evidence that either product or process innovations increase the probability of becoming a

first time exporter. Love and Mansury (2009), their study of exporting in US business services find that innovation has a strong positive effect on the probability of exporting, and a negative effect on export intensity. Becker and Egger (2013) find that, product innovation at German firms increasing the propensity to export, but process innovation does not. "Overall, the results point to the importance of product innovation relative to process innovation for the decision to export. Firms that perform both process and product innovation has a higher probability to export than firms that do not innovate; however, when performed alone, product innovation is more a determinant in the exporting behaviour. of a firm than is process innovation."

Halpern et al. (2012) studying Hungarian firms from 1992 to 2006 find that innovative firms are more productive, more likely to trade and export more products to more countries. "Innovative firms are more likely to export and their export intensity is larger. The decomposition of firm-level exports into the extensive and intensive margins shows that innovation has a positive effect on all margins of trade; innovative firms export to more countries, export more products and export more in one product–destination combination on average."

There have been many papers that have investigated the effect of R&D spending on exporting. Wagner (2001) finds a positive effect of R&D on exports for German firms. Rodriguez and Rodriguez (2005) examined the influence of the technological capacity of firm on both the decision to export and the level of export intensity of Spanish manufacturing firms, finding that "Product innovations, patents and process innovations positively and significantly affect the decision and propensity of exporting and that R&D spending has no impact on the decision to export, but it has impact on the export intensity." Lefebvre et al. (1998) investigating 101 Canadian SMEs firms, found that R&D activities influence exporting. Other studies that have found a positive relationship between R&D and export competitiveness include Basile (2001) for Italian manufacturing; and Barrios et al. (2003) show that R&D activities exert a determinant effect on the exporting decision and on the intensity, Aw et al. (2008) and Lileeva and Trefler (2007) find evidence exporting is correlated with firm investment in R&D and innovation. D'Angelo (2012) examining export intensity for Italian high technology SME firms in 2001/2003 and finds that R&D employees positively impact the export intensity whereas R&D expenditures do not, "Our analysis suggest that high technology SMEs and their managers should direct their innovative effort towards product innovations rather than process innovations if they want to perform in international markets."

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The most recent papers on UK innovation and exporting links include: Harris and Li (2005 2006, 2009, 2012) who demonstrate through empirical work on UK data, the links between exporting and innovation. Girma et al. (2008) compare the case of the UK and Ireland, highlighting the status of being an exporter as being the important determinant of innovation. Gourlay et al. (2005) study the determinants of export behaviour for a panel of over 1000 UK service firms for the period 1988 to 2001 using R&D intensity (R&D expenditure as a percentage of sales) as an indicator of innovation, and find that R&D intensity has strong positive effect on both the probability and intensity of exporting, "R&D intensity, we find a positive impact on export probability, thereby supporting technology and proprietary based explanations of exporting." Harris and Moffat (2012) uses data from the UK Community Innovation Survey (CIS) covering 2002-2008 for a selection of UK firms here, "Spending on R&D in manufacturing had a much larger impact on the probability of exporting which implies that spending on R&D was not simply to boost the probability of producing new goods and services, but also to improve the establishment's knowledge assets which would in turn help it break down barriers to international markets."

3.11.   <u>Absorptive capacity measures including human capital</u>

Other problems that firms have in exporting are their "absorptive capacity". This was defined by Cohen and Levinthal (1990) as, "ability to recognize the value of new information, assimilate it and apply it to commercial ends" and "these abilities collectively constitute what we call a firm's 'absorptive capacity' ". To adapt and penetrate new markets and new ways of organization such as exporting where they have little experience, firms must find and assimilate new knowledge.

These absorptive capacities can be measured in many different ways. For example, Cohen and Levinthal originally suggest a measure of how the firm innovates. This could be the firms that use their own research and development rather than buying the R&D of other firms that have more capacity. Vinding (2006) shows some of the components of absorptive capacity that have been put forward as measures of absorptive capacity including human capital, external knowledge and innovation. Human capital is the skill level of the firm personnel who can deal with new ideas and new methods of working. This could be measured in terms of percentages of graduates or percentage of the firm devoted to R&D spending. Zahra and George (2002) extended all the concepts of absorptive

capacity to include knowledge acquisition and assimilation capabilities and knowledge transformation and exploitation. This means that the greater a firm's exposure to diverse and complementary sources of knowledge and ability to adapt the easier it should be for the firm to break into exporting. For example, if a firm can work with other firms or with universities this shows they have the exposure to new knowledge and that they have the ability to apply innovation. It gives them a new knowledge base. Experience absorptive capacity comes in the form of the amount of innovation that a firm directly takes part in.

Absorptive capacity has been found to be significant as a determinant of exporting. Harris and Li (2009) model the determinants of exporting including absorptive capacity and innovation information to help find the "the role of knowledge-based assets in overcoming barriers to internationalisation." within the UK 2002-2005. Using a probit model the significant determinants of exporting included; "labour productivity, absorptive capacity measures, human capital, innovation measures and the size of the firm."

3.12.   The role of the internet in internationalisation

The Internet is a more recent business tool to make connections with new firms through e-commerce, through company websites, online catalogues and other forms of communication. These properties of e-commerce are sometimes described in terms of the 'death of distance' by Cairncross (2001), meaning that there is a reduction in the level of effort to contact people far away, though a different opinion might be from Moen et al. (2003) who explain that there might be problems with Internet-based direct sales channels, of limited applicability. Weill & Vitale (2001) show that the internet is providing firms with new ways to conduct business and to exchange and communicate ideas and information. Additionally, it has been suggested by Santarelli and Altri (2003) that employs a unique data set of Italian manufacturing, service, and hospitality firms (nearly 90% of them with fewer than 100 employees), that e-commerce can overcome some of the cost advantages that larger companies enjoy therefore it should be useful in increasing the propensity to export, "e-commerce turns out to be a highly pervasive innovation, although at the present stage of diffusion it does not represent a substitute for established marketing channels" for SMEs. Leonidou et al. (2007) explain that the internet may help exporting as it is an additional platform to receive unsolicited orders.

Particular types of firms might be more likely to use the internet, for example, born global firms which Madsen & Servais, (1997) suggest are "In order to survive and earn economic rents it is necessary for a Born Global to be at the edge of the development in their particular market or competence niche. Therefore, they have to be innovative. They must be able to reap advantages from the new communication technologies such as fax, database marketing, and internet. Otherwise they will not be able to maintain effective contact with the huge number of firms in the network in which they operate, including their own." As one of the largest potential benefits of e-commerce is in reducing transaction costs it might be more useful for particular types of transactions such as business-to-consumer (preferring service firms) than business-to-business (preferring manufacturing firms), though this depends on the size of orders and the number of purchases and perhaps how specialised each product is. With larger orders that are more infrequent and more specialised it is thought that more traditional methods of sales offering a more customisable service might be preferred, and in the opposite case there might be larger benefits of low transaction costs.

However, the role of e-commerce may not be able to fully replace more traditional methods. Using e-commerce without traditional sales methods may reduce the human interactivity and the relationship between the firm and it's clients may be weaker, these weaker ties may reduce repeat business and may also reduce channels of feedback. Moen et al., (2003) suggests that "both conventional and Internet-based channels" still need to be used. The Internet can not fully replace the cultural and business learning associated with physical presence in foreign market and therefore following this line of reasoning it might be expected that firms could concentrate on using e-commerce as a replacement rather than as a complement. Yamin & Sinkovics, (2006) suggests over-reliance on e-commerce can lead to worse market knowledge.

Most recently for the UK, Ganotakis and Love (2011) suggest that the use of e-commerce did not significantly to boost entry into export markets, but the intensity of its use is associated with increased export intensity. E-commerce was positively associated with export intensity; "calculated at the respective means, a 1 increase in internet sales intensity raises export intensity by around 0.1."

3.13.   Subsidies or advice from Government on how to internationalise

Receiving subsidies or advice from the government to export could mean that there is a much reduced cost in exporting. Arguments against the use of export subsidies are that they are very easy to abuse, which renders them ineffective in achieving their original goals such as explained by Nogués (1989). Volpe Martincus and Carballo (2008) and Helmers and Trofimenko (2013) find some positive effects of export subsidies using firm level data for Peru and Colombia respectively. Görg et al. (2008) report that while such production subsidies in the Republic of Ireland do not encourage firms to start exporting, they encourage previous exporters to export more. Girma et al. (2009) document that that exports and subsidies are positively related in Germany.

3.14.   Foreign Ownership

A firm that is foreign owned might be part of a supply chain, with more links abroad that may lead the company direction to lean towards exporting and there will be more knowledge of outside markets. Also foreign ownership may bring indirect effects such as better production and process technology which could, for example, improve labour productivity.

Kneller & Pisu (2004) and Helpman et al (2004) argue that foreign affiliates and domestic firms are usually shown to display substantial differences in exporting behaviour. Kneller and Pisu show that the determinants of both export market entry and export intensity of domestic firms differ significantly from foreign owned firms, "foreign firms are more likely to export, and when they do so are more export intensive". Sjöholm (2003) examines Indonesian firms and finds evidence to suggest that foreign ownership and the membership of foreign networks can influence firm's export decisions.

Ngoc and Ramsetter (2009) analyse data on multinational firms in Vietnam to examine the relationship between foreign ownership and exports in the Vietnamese manufacturing sector. They find that companies with very high share of foreign ownership make a disproportionate contribute to Vietnam's manufacturing exports. Wakasugi and Zhang (2013) studying Chinese firms find that there are differences for firms that are foreign-owned "We find that privately-held and SOE firms must be highly productive to engage successfully in both exporting and FDI, whereas foreign-owned firms need relatively little productivity to be successful exporters and foreign direct investors."

Most recently Harris and LI (2011) find that " Foreign-owned establishments had significantly higher export propensities (e.g. being US-owned resulted in a 34.2% higher probability of exporting, while other foreign-owned establishments were 23% more likely to export, compared with their UK-owned counterparts."

3.15. Outward FDI status

Outward FDI may increase the likelihood of exporting as indirect spillovers of knowledge may create opportunities to export. Firms that have already invested in the knowledge have already spent money on the sunk entry costs to gain that knowledge. Therefore these firms should be more likely to export as they have an easier path towards exporting. However there are differences between whether exporting is a complement to FDI or a substitute, as local production could be more profitable then exporting. Chow (2012) examines the effect of outward foreign direct investment (FDI) on Taiwan since the late 1980s. It is concluded that outward FDI has a complementary effect on home country's export in Taiwan. Oberhofer and Pfaffermayr (2012) applying a Helpman (2004) type model for companies located in 10 European countries such as the UK and France, find that that "The most horizontally integrated enterprises do both, export and produce locally abroad, which can explain a complementary relationship."

The partners of a firm may affect a firm's exporting ability. Ruzzier et al. (2007), "more than inward operations, outward operations can in the long term increase the competitive advantage of a company, organization or a country". Johanson & Vahlne (2009) explains the importance of networks for SME's. Networks are organized around a web of contacts that can provide formal and informal information and knowledge. With limited internal resources networking can help firms improve contacts so that the extent and the strength of networks is an important factor. By engaging in outward activities, the firm extends its network to foreign markets which is important for new technologies and new trends, local competitors, specific cultural traits and customs.

3.16. Distance from land border

Leamer and Levinsohn (1995) believe that one of the most important determinants of the magnitude of trade between regions is distance with transport costs higher the higher the distance to a foreign market. Evenett and Venables (2002) show that proximity to an

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existing market was a consistently significant factor in determining expansion into new markets for sector-level exports from developing countries. Blum and Goldfarb (2006) find that distance matters even for digitally-traded good. Disdier and Head (2008) use aggregate gravity estimation and find that the distance between two countries consistently has a strong, negative effect.

3.17.   <u>Conclusion</u>

Using these results from the literature review there are strong hypotheses that can be made as shown in Table 3.1.

Table 3.1: List of hypotheses

Variables	Hypotheses
Region/countries	Different regions have advantages due to agglomeration, with better transport links or workers. Additionally countries may have different cultural effects and different institutions or laws.
Being in a country that is part of a trade union	Being part of a trade area such as the Euro, may allow simpler transactions and this reduction in transaction cost will allow easier exporting.
Size/ productivity	Firms that employ more workers or firms that have higher labour productivity may find it easier to export as the sunk cost of exporting can be met. Larger firms may have more capacity to absorb costs.
Industry	Different industries have advantages due to agglomeration of contacts within industries letting them export more easily. Other more direct effects are that firms may have a product or service which is more easily transportable abroad.
Imports	Different levels of imports from abroad could improve the product mix and also create indirect contacts within foreign countries, making exporting easier.
Age of firm	Older firms may have more experience and more foreign market knowledge, making exporting more likely. Alternatively this effect maybe reduced by Born-global firms, who decide to export early after their inception.
Export destination	The cost to exporting to some countries may be higher, due to further distance or further psychic distance.
Barriers to exporting	Specific barriers to exporting may include liquidity constraints as firms may need to borrow to become exporters.

Variables	Hypotheses
Previous exporting	Firms that have previously exported have already shown they have the knowledge and expertise to export.
Innovation and absorptive capacity	Firms that undertake innovation show that they have ability to change and also may have better products or services.
E-commerce	Having e-commerce ability will reduce transaction costs leading to new and cheaper methods of exporting.
Subsidies	Subsidies or other public sector support will allow firms to pass some of the costs of exporting.
Foreign ownership	Being owned by a firm from a foreign country will boost links and the outward directions of firms.
Outward FDI Status	Being able to use FDI shows a high level of competence and enterprise, suggesting that the firm is likely to have the abilities to be an exporter.
Distance from the land border	Being further from a land border means that goods or services will have to travel further. This would mean potentially higher costs and also reduced contact with the border.

The next Chapter is Chapter 4 and this deals with the determinants of Scottish exporting including surveys from the GCS 2006 and a self made survey, with analysis empirically.

4. Determinants of Scottish Exporting

This chapter deals with the economic characteristics that lead firms to export in Scotland. The literature review in Chapter 2 and 3 has shown many of the characteristics that theoretically and empirically affect a firm's propensity to export. As has been previously explained, firms that export have been found to have certain characteristics such as "Exporters are larger, more productive, more capital-intensive, more technology-intensive, and pay higher wages." from Bernard and Jensen (1999). There is a wide range of literature that agrees exporters are the better firms on many suggesting that firms need a minimum level of characteristics to be able to surmount any barriers to internationalization. Melitz (2003) provides a model based on productivity and in this model firms have fixed costs of exporting and only firms with sufficient productivity can absorb these costs. These costs could come from different sources such as the fixed costs from transportation, servicing, costs due to translation difficulties and distribution costs. The more productive firms can absorb the costs of exporting while the least productive firms can only serve their local market. Therefore it would be expected that smaller firms in size or smaller turnover might be prevented from exporting.

Firms may not necessarily choose to export but there are reasons that firms should prefer to export, for example, there is increasing liberalisation in the world economy. Melitz (2003) explains that this benefits those who export through higher profits. Also, those who do not export have additional problems through increased trade liberalisation and they have to compete with foreign producers and also have extra competition for inputs as the exporters need more inputs to meet their increased demand. Or alternatively, Melitz and Ottaviano (2005) suggest that this increased trade liberalization just reduces industry mark-ups as there is more competition. Firms should wish to export to be more competitive and to have increased profits. This chapter studies economic characteristics of firms in Scotland that are associated with firms becoming exporters. Data for Scotland is limited, with the main source being the Global Connection Survey (GCS), though there have been some UK specific studies to find the determinants of exporting. For this reason the self made survey for 2010 was created and utilised, based on theory.

This work seeks to explore three points:

a) The first stage involved examining GCS 2006 (Global Community Survey for 2006) data (Model 1)

b) How to construct a survey to find more recent and richer data

c) The same factors from Model 1 using survey data from 2010 on Scottish firms: What factors determine whether a firm becomes an exporter in Scotland in 2010 (Model 2)

d) Applying the extra information in the survey: what factors determine whether a firm becomes an exporter in Scotland in 2010 (including questions, such as absorptive capacity) to find a better model (Model 3 (a) and (b))

These models were compared and conclusions were made. The next section deals with the variables and the data source for the models.

4.1. <u>Variables</u>

There are two data sources, GCS 2006 data and a self created survey in 2010. There were more variables that could be created in the self created survey as it had been specifically designed to allow a richer selection of variables for a better model. A fuller explanation for the reasoning of using these variables is shown in Chapter 2 and 3.

In this section, firstly a description of all the variable's definitions will be presented (Table 4.1), then collection and statistics on the GCS 2006 (section 4.5), followed by the economic reasoning for creating these variables (section 4.5) and their potential connection to exporting. Next the collection (section 4.7) and copy of the questionnaire questions for the self made survey 2010 (section 4.7.1) is presented, and then the economic reason for the variable choices for models 3 (a) and (b) (section 4.9). Section 4.9.4 to 4.9.11 explains how the principal component factors were created and the matrices of the factor loadings are in the appendix Tables A1-A9). For quick reference, section 4.3 and 4.4 explain which variables are in the models.

Presentation of the background for the variables then allows section 4.10 to section 4.16 to show the models. The aim of model 1 was to identify the determinants of exporting; using the most up to date data source on exporting solely in Scotland. This would allow further ideas and improvements to build a survey and a better model, such as in model 3, with the same variables from model 1 being used on model 2 to allow comparison of the data set. Each model that is made will build on the previous and by utilising extra variables give greater explanatory power of the determinants of exporting. The resulting model 3(b) should be supported by the other models and will contain the most recent and unique survey information in Scotland for 2010. Conclusions are presented in Section 4.17.

4.2. Definitions of variables

Table 4.1: Definitions of variables

Variable	Definition	Model	Hypotheses
Previous export	A dummy variable showing whether the firm exported in the previous 3 years.	3(b)	+
Region	A dummy variable showing which region the firm is in.	All	-/+
Industry	A dummy variable showing which industry the firm is in.	All	-/+
Employs <10	Coded 1 if company currently employs <10	All	-
Employs 10-25	Coded 1 if company currently employs 10-25	All	-
Employs 25-50	Coded 1 if company currently employs 25-50	All	-
Employs 50-180	Coded 1 if company currently employs 50-180	All	+
Employs 180+	Coded 1 if company currently employs 180+	All	+
Outward FDI	A dummy variable = 1 if the firm operates a Subsidiary overseas/ Sales Office overseas/ Joint Venture overseas.	All	+
Single enterprise	A dummy variable = 1 if the establishment was a single-plant enterprise with no other operations in the UK	1	+
Size of graduates workforce	Proportion of employees educated to degree level or above in the establishment, broken down into 4 bands, i.e. 0-3 graduates, 3-27 graduates, 27-55 graduates, and 55+ graduates	All	+
Management experience			
Management experience selling outside Scotland	A dummy variable = 1 if current members of the senior management team/CEO have or had previous to exporting experience selling outside Scotland.	3	+
Management experience working for a firm that had exported	A dummy variable = 1 if current members of the senior management team/CEO have or had previous to exporting experience working for a company that has exported or	3	+
Management experience working outside Scotland	A dummy variable = 1 if current members of the then senior management team/CEO have or had previous to exporting experience working outside Scotland.	3	+

Variable	Definition	Model	Hypotheses
Management experience(cont.) Management Experience working for a multinational company	A dummy variable = 1 if current members of the senior management team/CEO have or had previous to exporting experience working for a multinational company.	3	+
Principal component factors Strong products/services factor	Principal Components Factor based on Products and services questions Table A4	3	+
Strong and quick spread of information	Principal Components Factor based on information knowledge questions Table A7	3	+
Strong culture factor	Principal Components Factor based on culture questions Table A8		
1.Strong TPM, IS09001, continuous improvement use 2.Strong Lean use	Principal Component Factors based on management techniques employed for one year at the firm. The structure matrix of factor loadings is in Table A2	3	+
1.Strong TPM, IS09001, continuous improvement use 2.Strong Investor in people use	Principal Components Factors based on management techniques employed for two years at the firm. The structure matrix of factor loadings is in Table A3	3	+
Strong management factor	Principal Components Factor based on management questions see Table A5	3	+
Strong training and spending on innovation activities	Principal Components Factor based on innovation applied by the firm see Table A9	3	+
1.Problems obtaining customers 2.Need to keep business stable	Principal Components Factors based on Business Direction questions Table A6	3	-

Variable	Definition	Model	Hypotheses
1.Strong sources from journal/industry 2.Strong national co-operation public domain source 3.Strong international co-operation consultant/public research 4.Strong public domain sources 5.Strong int. co-operation between client and supplier Public sector support from SDI	Principal Components Factors based on sources of knowledge (see Table A1)	3	Unknown expected results
SDI help measure	A dummy variable = 1 if Scottish Development International helped the firm 2009-2010 with any of : Export training, Introductions to potential overseas customers, Exhibiting at trade fairs, International marketing, Developing an international trade strategy, Finding joint venture partners	3	+
Foreign owned	A dummy variable = 1 if the headquarters of the firm is outside of Scotland (England counts as being foreign owned)	3	+
Innovation			
Process Innovation	A dummy variable = 1 if the firm introduced new improved processes for producing/supplying products during 2008-2010	3	+
Blue skies Innovation	A dummy variable = 1 if the firm introduced Blue Sky innovation during 2008-2010	3	+
Product Innovation	If the firm introduced new improved products 2008-2010	3	+
Age of firm	A dummy variable = 1 if the firm for any of the three categories : Existed for more than 25 years, Existed for 25-10 years, Existed for less than 10 years	3	Unknown expected results

Model 1 – GCS 2006 DATA - 2288 firms, Model 2 – Survey 2010 data - 303 firms, Model 3 – Survey 2010 data - 303 firms

4.3. Variables for model 1 and model 2

Model 1 – GCS data 2006 - 2288 firms   Model 2 – Survey data 2010- 303 firms

Table 4.2: Variables for model 1 and model 2

Variable	Type of variable
Industry	Dummy
Region	Dummy
Size	Dummy
Outward FDI	Dummy
Foreign Ownership	Dummy
Single enterprise (not used in model 2)	Dummy

4.4. Variables for model 3 (a) and 3 (b)

Model 3 – Survey data - 303 firms

Table 4.3: Variables for model 3 (a) and 3 (b)

Variable	Type of variable	Source
Industry dummy	Dummy	Survey 2010
Region dummy	Dummy	Survey 2010
Size band dummy	Dummy	Survey 2010
Outward FDI dummy	Dummy	Survey 2010
SDI help	Dummy	Survey 2010
Age of firm	Dummy	Survey 2010
Previous exporting (not used in model 3 (a))	Dummy	Survey 2010
Absorptive capacity measure		
Business Direction	Factor analysis - continuous	Survey 2010
Products and services measure	Factor analysis - continuous	Survey 2010
Source of knowledge measure	Factor analysis - continuous	Survey 2010
Management Measure	Factor analysis - continuous	Survey 2010
Information knowledge measure	Factor analysis - continuous	Survey 2010
Innovation Measure	Factor analysis - continuous	Survey 2010
Blue sky innovation	Dummy	Survey 2010
Process Innovation	Dummy	Survey 2010
Product Innovation	Dummy	Survey 2010

4.5. Collection and statistics on GCS 2006

The first step in identifying the determinants of exporting is by examining Scottish wide data in the form of the GCS 2006. The GCS 2006 is an annual survey of Scottish businesses conducted in 2006 that collected information on exports and international connections of companies in Scotland and is the only export survey covering all sectors of the Scottish economy. The survey sample was extracted from the Inter Departmental Business Register (IDBR) and included all industries with the exception of public administration, private households with employed persons and extra-territorial organizations. Sampling took place at reporting unit level and reporting units were asked to provide information on the combined Scottish activity of all their local units. Known and potential exporters were weighted in order to have a greater chance of being sampled than non-exporters or companies whose export status was unknown. Companies were then selected at random from the strata. Those with 100 or more employees were automatically sampled regardless of their export status and all known potential exporting companies were sampled regardless of their size. In all 2,288 firms were recorded in the GCS 2006 data.

Table 4.4 gives summary statistics on the data such as the percentage of the variables that are exporters; with for example 38% of the 100 firms from the Forth valley being exporters. Additionally, for comparison the percentage they consist of the firms that do not export and the percentage they consist of the percent that export is shown.

Table 4.4: Statistics on variables created from GCS 2006

Variables	Number of firms	% that are exporters	% of none exporters	% of exporters
Size of firm				
Employs < 10	889	38.9%	42.1%	34.6%
Employs 10-25	504	43.7%	22.0%	22.0%
Employs 25-50	290	45.9%	12.2%	13.3%
Employs 50-180	364	49.2%	14.4%	17.9%
Employs 180+	241	50.6%	9.2%	12.2%
Region				
Forth Valley	100	38.0%	4.8%	3.8%
Lanarkshire	204	41.2%	9.3%	8.4%
Fife	129	46.5%	5.4%	6.0%
Glasgow	251	50.6%	9.6%	12.7%
Renfrewshire	83	51.8%	3.1%	4.3%
Borders	74	37.8%	3.6%	2.8%
Argyll and the islands	86	33.7%	4.4%	2.9%
Tayside	161	40.4%	7.4%	6.5%
Edinburgh & Lothian	294	48.6%	11.7%	14.3%
Grampian	263	55.1%	9.2%	14.5%
Dumfries & Galloway	67	52.2%	2.5%	3.5%
Aryshire	116	42.2%	5.2%	4.9%
Inverness & east highland	164	36.6%	8.1%	6.0%
Moray	69	26.1%	2.2%	2.6%
Skye and Wester Ross	24	37.5%	2.2%	0.3%
Dunbartonshire	55	47.3%	1.2%	0.8%
Shetland	31	9.7%	1.4%	1.1%
Lochaber	23	34.8%	1.6%	1.1%
Orkney	29	37.9%	1.9%	0.8%
Caithness & Sutherland	32	34.4%	4.8%	3.8%
Innse Gall	33	24.2%	9.3%	8.4%
Single enterprise/ outward FDI				
SingleEnterprise	375	59.2%	11.9%	22.2%
ForeighOwned	79	60.8%	2.4%	4.8%
OutwardFDI	413	66.1%	10.9%	27.3%
Industry				
Forestry/agriculture	109	35.8%	5.4%	3.9%
Manufacture of food	102	36.3%	5.0%	3.7%
Manufacture of drink	31	38.7%	1.5%	1.2%
Manufacture of wearing apparel	64	31.3%	3.4%	2.0%
Manufacture of pulp paper	52	30.8%	2.8%	1.6%
Publishing	49	44.9%	2.1%	2.2%
Manufacture of chemicals	47	48.9%	1.9%	2.3%
Manufacture of non metallic mineral	72	30.6%	3.9%	2.2%
Manufacture other machinery	172	49.4%	6.7%	8.5%
Manufacture electrical machinery	49	55.1%	1.7%	2.7%
Manufacture medical instruments	30	56.7%	1.0%	1.7%

Variables	Number of firms	% that are exporters	% of none exporters	% of exporters
Manufacture other transport equipment	25	60.0%	0.8%	1.5%
Manufacture furniture	55	36.4%	2.7%	2.0%
Electricity/gas supply	11	0.0%	0.9%	0.0%
Wholesale trade	166	23.5%	20.3%	13.3%
Hotels and restaurants	395	33.7%	2.3%	4.6%
Auxiliary transport activities	76	60.5%	4.1%	5.6%
Auxiliary/ financial	109	51.4%	2.6%	3.5%
Renting machinery	68	51.5%	1.7%	1.8%
Other business activities	40	45.0%	10.2%	25.1%
Education	382	65.7%	2.5%	2.4%
Other service activities	56	42.9%	5.5%	4.1%
Other mining	112	36.6%	1.0%	0.2%
Construction	15	13.3%	9.9%	3.9%

Table 4.4 shows that across the regions there are some definite patterns with regions that are more urbanised such as Edinburgh of which 48.6% are exporters, Glasgow of which 50.6% are exporters and Renfrewshire of which 51.8% are exporters; more remote regions, such as Inverness of which 36.6% are exporters & Moray of which 26.1% are exporters. Some sectors seem to have links positive and negative on the likelihood of exporting, for example, 'manufacture other machinery' has 49.4% are exporters and 'other business activities' has 45%; while 'construction' has a much lower level of exporting with only 13.3% of 'construction' firms exporting.

There seems to be a link between firms with more employees and exporting with firms that 'employ 180+' having 50.6% exporters compared to 38.9% of firms who employ less 'than ten employees'. Other notable differences include of firms that are 'single enterprise' 59.2% export and of firms that use 'Outward FDI', 66.1% export.

4.6. <u>Variables used in Model 1 and Model 2</u>

4.6.1. <u>Industry/services sector</u>

Firms gave information on which industry and services they would select themselves as. Being in a particular industry or service may mean that there are direct effects such as the nature of the product or service meaning that it is easier or more likely to export which is important, for example, Contractor et al. (2007) concludes that the barriers to internationalisation are lower for service firms than for manufacturing enterprises, though other factors affect such as the transportability of the products. The industry that the firm is located in might affect a firm and how it exports through indirect effects with Requena and Castillo (2007) find that the probability of exporting to a specific destination by new exporters is positively linked to the presence of nearby exporters from the same industry.

For the GCS 2006 (shown in Table 4.4), some of the differences between industries are that might show themselves are that of 'manufacturing of clothes', 31.3% were exporters, of wholesale trade 23.5%, of 'construction' 13.3%, while other sectors have higher levels such as 'manufacturing other machinery', 49.4% are exporters, 'transport activities' 60.5% export, and 'financial' 51.4 % are exporters. In the self made survey 2010 in Table 4.5 there are some industries that have a high percentage of exporters such as 'publishing' and 'manufacture of chemicals' both have 100% exporters, and others such as 'utilities' and 'hotels and restaurants' both have 0% exporters.

Therefore the hypothesis is that: some industries will have negative effects such as hotels and restaurants in the self-made survey 2010, and some will have positive effects, such as manufacturing, on whether a firm is likely to export.

4.6.2. <u>Regions</u>

As shown in Table 4.4 firms were placed into different regions, cities such as Edinburgh and Glasgow, and other more remote regions such as Shetland and Moray. The different levels of infrastructure and transport links, combined with distance to an export market and the availability and quantity of inputs such as workers and raw materials may all be affected by

regions. These direct effects , such as major rail or air links, or indirect in terms of informal contacts that might occur due to the agglomeration factors of new trade theory, could theoretically effect the ability of a firm to export. Using data on UK firms, Harris and Li (2009) found that regions have a different role in determining only the intensity of exporting rather than the firm being an exporter or not.

For the GCS 2006 in Table 4.4 some of the differences that might show up between include low levels of exporters within them, such as Shetland, 9.7% of which export; medium levels of exporters such as Moray, of which 26.1% are exporters; or higher levels such as Grampian of which 55.1% export.

For the self made survey 2010 (shown in Table 4.5), only 23.5% of firms based in Inverness export; while some of the regions with higher percentages of exporters include Renfrewshire, 75% of which are exporters; and Dumfries & Galloway, 70% of which are exporters.

Therefore the hypothesis is that: different regions will have different effects on exporting, for example Glasgow and Edinburgh are more populous than the other regions and also have airports and rail links which should lead to larger positive effects over other regions.

4.6.3. Size of firm

Firms gave values of the number of employees and the expectation is that more employees increase the ability of firms to export. Larger firms may export such as they have larger economies of scale meaning they wish to have a larger market and also potentially more skills to export. However, larger firms may not in all cases be superior at exporting, with for example, Bonaccorsi (1992) arguing that small firms can obtain the necessary resources either by the vertical integration of export functions or by access to external resources, perhaps through co-operation with other firms.

The GCS 2006 shows differences between firms of different number of employees with the highest level of exporters for those firms that that employ more than 180 workers, with 50.6% that export, which declines as a percentage across the smaller sizes of employees, reaching 38.9% of firms that employ 'less than ten people'. A similar pattern seems to exist for the self

made survey 2010, shown in Table 4.5, where there is a large difference between those firms that more than employ '180+ workers' of which 75% export compared to 41.2% of firms that employ 'less than ten people'.

Therefore the hypothesis is that: firms that have more employees will be more likely to export as they have advantages of economies of scale.

4.6.4. Activity abroad/ Foreign ownership

Firms gave details of the number of contacts and offices they had abroad, which included partnerships and details such as whether there was local production abroad. This may affect the exporting ability of the firms, with for example Ruzzier et al. (2006) stating "more than inward operations, outward operations can in the long term increase the competitive advantage of a company, organization or a country". Additionally outward operations can lead to more contacts and opportunities, for example, Johanson & Vahlne (2009) explains the importance of networks for firms, particularly SME's. Networks are organized around a web of contacts that can provide formal and informal information and knowledge. By engaging in outward activities, the firm extends its network to foreign markets which is important for "new technologies and new trends, local competitors, specific cultural traits and customs." The GCS 2006 data shows that firms who use FDI are more likely to export as there is a high percentage of those firms that export at 66.1%. An even stronger association between 'Outward FDI' and exporting is for the self made survey 2010 in Table 4.5; 93.0% of firms that use 'Outward FDI' are exporters while 92.3% of firms that are foreign owned export.

Therefore the hypothesis is that: having more infrastructures such as offices to acquire inputs or a sales office may reduce the costs of exporting, this effect or others will lead firms to be more likely to export. Additionally having contacts abroad though FDI should increase firm's knowledge of foreign markets.

4.6.5. <u>Single enterprise</u>

A single enterprise firm was defined as a firm that only had one operation in the UK and therefore is less likely to be part of a firm's supply chain to other enterprises run by the same firm in the UK. The GCS 2006 shows that there are a high percentage of 'single enterprise' firms that export of which 59.2% export. For the self made survey this question was not asked and this question could only be asked for model 1.

Therefore the hypothesis is that: 'single enterprise' firms may be more likely to export if they are not part of a supply chain and vertically integrated with other enterprises which may wish to use their output as their own inputs.

4.7. <u>Collection and statistics on the self made survey 2010</u>

To collect a new sample it was decided to contact firms from the GCS 2006, though not all firms could be surveyed, instead a matched sample was created based on the results from Model 1. 1,000 exporters were matched to 1,000 non-exporters based on their propensity to export, the closest matches to the firms would be found based on the propensity score. Exporters and non-exporters are "matched" to the nearest firm in terms of the propensity score measure, nearest matching, no replacement for example. Firms that have similar variables have as close as possible the same "propensity" to export.

Letters were sent to the sample of firms in early December 2010. Responses could be sent via letter, or email, both answering the same set of questions. The letter contained four A4 sides of a covering letter and questions which are shown in section 2.6.1, and was carefully balanced to try to gain as much information as possible in the shortest possible amount of time. Firms were also given the choice of using a web survey program called Quask, asking the same questions as the letter, Quask then delivered emails. Consideration was taken to find factors that had been found to be significant in other studies taken from the literature review in Chapter 2 and 3. The letters were addressed to the export department of the company, though unfortunately were sent out during bad weather and by early January 2011 with 600 letters being returned as undeliverable, letters were sent as reminders to firms that had not replied initially. Eventually there were 260 letter replies and 43 email replies.

4.8. <u>Purpose of matching and the success of matching</u>

New data was collected as a matched sample based on the GCS due to there being limited resources to survey all firms in Scotland and to balance out the numbers of non exporters and exporters. Therefore a 'control' group of non-exporters is being matched to a 'treatment' group of exporters, reducing the number of non-exporters being sampled.

The propensity score was defined by Rosenbaum and Rubin (1983) to be the probability of treatment and assignment conditional on observed baseline covariate. The propensity score is a balancing score: conditional on the propensity score, the distribution of measured baseline covariates is similar between treated (exporting) and untreated (non-exporting) subjects. Thus, in a set of subjects all of whom have the same propensity score, the distribution of observed baseline covariates will be the same between the treated and untreated subject. Matching on propensity score can create good matched-pairs. Matching on the propensity score can also balance case and control groups, or create covariate balance. Alternatively a random sample would have meant contacting all firms the full sampling frame would be required. The advantages to the method would be that it is relatively simple, the disadvantages are that it would require a certain amount of resources. Another option would be stratified sampling where certain types of firms would be sampled, for example the strata could have been all industries, with the firms sampled chosen from each strata. The difficulty of using this method is that there are potentially many strata, for example if industry is chosen, and decisions about the applicability of such a large number of strata, or the number of firms to be sampled from each strata. Potentially important variables maybe under represented from the sample, as the criteria focuses on the strata but the advantages of using this method are that less resources could potentially be used, compared to random sampling also comparisons could be made across strata. Matching means that there will be a wide range of propensities to export from the largest possible negative figure to the highest possible positive figure, all possible types of control group members are part of the sample and included in analysis. Random sampling might miss particular groups of exporters, meaning that there is no bias to avoiding particular groups of exporters. By selecting the firms through matching the possibility that types of exporters will not be chosen, should be hopefully avoided as there already knowledge on the

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types of variables that may effect whether a firm is an exporter. However, as the data was matched on characteristics that were significant in probit 1, there is a possibility that there will not be significant differences on the significant variables found in the later probits using the self made survey. A measure of the success of matching is given by the pstest command in stata, which presents data such as the means of the samples, that is the previous unmatched sample and the new matched sample. It also shows how much bias is reduced across all variables. The variables showed a large reduction in sample bias. The t-test based comparisons after propensity score matching are not mentioned as they are highly controversial with assumptions such as the variables being sensitive to sample size.

Potentially any difference in the following probits using the new sample shows that the two groups have not been balanced or matched properly. It is important to note that if all firms responded and the model was correctly matched, the variables might be expected to be negligibly different (though the variables used in the matching exercise were much limited compared to those in the full survey), notwithstanding the changes in the time period. Indeed as the subsequent probits show, there are many significant variables, which could suggest that the data collected was either not correctly balanced by propensity score matching, or that there have been changes such as the time period. The difference between the time periods of 2006 and 2010 helps mitigate against the fact that running a regression on a fully answered survey may have shown up negligible differences between firms as the different circumstances between those two time periods, such as the 2007/2008 ongoing "liquidity crunch" and also the fact that not all firms responded. This difference in time, supported by not all firms responding, mitigates for a sample has been generated that is balanced in terms of exporters and non-exporters, for meaningful results that are not biased by the fact that the data has been matched to make sure that the firms not surveyed were not removed without a justifiable reason. The remaining sample (303 firms) turns out that there are many significant variables, showing that the data does not show any negligible differences and also suggests that there may have been weaknesses in using matching as a sampling method, meaning that the sample could be viewed more as a sampled strata – exporters to non-exporters.

4.9. Survey 2010 questions

What is the main product or service produced by your Scottish operations?
…………………………………………………………………………………………………
……………………………………..

In which city and country is the ultimate headquarters of your firm? (Please give

city and country) City…………………………………………………Country

………………………………………………………………..

What is the legal status of the company? (Sole proprietor, Private company, Public limited company, Other – please state)
…………………………………………………………………………………………………
……………………………………..

In what year was the business founded? (ignore any takeovers or mergers)
……………………………………………………

How many current fulltime employees are there at your firm?
……………………………………………………………

How many part-time employees?   …………………..
…………………………………………………………….………….

Please estimate the % of employees with a University degree (BA/BSc, MA/MSc, Ph.D. etc.)   %

Please estimate the current annual total turnover of the firm (in thousands of pounds)

<250k † 250-500k † 500-999k † 1000-1999k † 2000-2999k † 3000-3999k † >4000k †

Do you currently export goods/services outside the UK?   Yes †   No   †

If YES, before engaging in exporting: (please tick all that apply)
† Did members of the then senior management team/CEO have experience selling outside Scotland?
† Did members of the then senior management team/CEO have experience working for a company that had exported?
† Did members of the then senior management team/CEO have experience working outside Scotland?
† Did members of the then senior management team/CEO have experience working for a multinational company?
† Do not know as have been engaged in exporting for too long to recall

Irrespective of whether you currently export or not: (please tick all that apply)
† Do current members of the senior management team/CEO have experience selling outside Scotland?
† Do current members of the senior management team/CEO have experience working for a company that has exported?
† Do current members of the then senior management team/CEO have experience working outside Scotland?

† Do current members of the senior management team/CEO have experience working for a multinational company?

In the next 3-5 years what is the single most important factor that you would say will provide the competitive edge for your business here in Scotland? (please tick ONE option only)

† Your product design   † Your cost effectiveness
† Your process technology   † Your marketing
† Your financial management

Without the need for any fundamental, major changes in its design or specification how many years have your current <u>most</u> <u>important</u> product(s)/service(s) been available to customers? ………years

Does your business in Scotland use any of these business improvement methods? (please tick all that apply)

Methods	Current Year	If present for more than 2 years
Total Quality Management (TQM)	†	†
Continuous Improvement	†	†
Balanced Scorecards	†	†
Lean	†	†
Total Quality Management (TQM)	†	†
Total Preventative Maintenance (TPM)	†	†
ISO 9001	†	†
Investors in People (IiP)	†	†
European Business Excellence Model	†	†
ISI14001	†	†
Other …………………………………..	†	†

Please consider the following statements about the Scottish activities of the firm (please tick one response each line)

Products and services questions to be rated:

We regularly compare our products and services with those of our competitors

We are committed to making our existing products and services obsolete by introducing new ones

Our products and services use better technology than our competitors

Our products/services have a high level of technology built into them

Culture questions to be rated:

There is a strong team spirit at all levels of the organisation

The organization is not bureaucratic

There is a feeling of openness in this organization

The culture in this organisation promotes change

The majority of employees get useful feedback about their work/performance

Management questions to be rated

Management fosters creative thinking and innovation in the company

If the company is performing well, change is still a priority

Our top managers continually like to try new ways of doing things

Management encourages everyone in the organization to come up with new ideas.

Business Direction

The main problems of the business are obtaining customers and delivering the product or service.

The Company now has sufficient customers and satisfies them sufficiently with its products or services.

The decision currently facing management is to keep Scottish activities stable and profitable (rather than to expand)

The key problems facing the Scottish company are how to grow rapidly and how to finance this growth.

Information Knowledge questions to be rated :

Information/knowledge is effectively managed and used throughout the organization
Information/knowledge is held at all levels in the organization
Efforts are made to share information/knowledge across the organization
Lessons learned from daily experiences and projects are captured and disseminated
New information/knowledge is effectively incorporated within the processes and routines within the organization
Information/knowledge about competitors is effectively managed within the organization

During the three year period 2008-2010 did your Scottish business source information for any <u>innovation-related activities</u> with any of the following? (please tick one answer for each source)

Sources of information from:	High	Medium	Low	Not applicable
Within your enterprise or enterprise group	†	†	†	†
Suppliers of equipment, materials, services, or software	†	†	†	†
Competitors or others enterprises in your industry	†	†	†	†
Consultants, commercial labs, or private R&D institutes	†	†	†	†
Universities or other higher education institutions	†	†	†	†
Government or public research institutes	†	†	†	†
Conferences, trade fairs, exhibitions	†	†	†	†
Scientific journals and trade/technical publications	†	†	†	†
Professional and industry associations	†	†	†	†
Technical, industry or service standards	†	†	†	†
Clients or customers	†	†	†	†

During the three year period 2008-2010 did your Scottish business co-operate on any innovation-related activities with any of the following? (please tick as many answers as apply for each type of partner leaving blank if it does not apply)

Located in: Co operation partners:	Scotland	Rest of UK	Rest of European Union	North America	Rest of World
Other enterprises within your enterprise group	†	†	†	†	†
Suppliers of equipment, materials, services, or software	†	†	†	†	†
Competitors or other enterprises in your industry	†	†	†	†	†
Consultants, commercial labs, or private R&D institutes	†	†	†	†	†
Universities or other higher education institutions	†	†	†	†	†
Government or public research institutes	†	†	†	†	†
Clients or customers	†	†	†	†	†

During the 3 year period 2008-2010 did your firm engage in any of following innovation-related activities? (tick all that apply)

† Acquisition of machinery equipment & software for innovation activities   † Training for innovation

† R&D that was done by another company outside the enterprise   † All forms of Design for innovation activities

† R&D that took place within the Scottish enterprise   † Purchase of external knowledge for innovation

† Spending on the Market introduction of innovations (e.g., advertising, market research)

During the three-year period 2008-2010, did your enterprise introduce any new or significantly improved (i) processes; (ii) products or (iii) engage in blue-skies R&D? (please tick at most two boxes in each row)

Types of innovation	Conducted in the period 2008-2010	Mainly by your Scottish business or enterprise group	Mainly by other enterprises or institutions	Mainly by your business together with other enterprises or institutions
Process Innovation	†	†	†	†
Product Innovation	†	†	†	†
Blue-Skies R&D	†	†	†	†

Approximately what percentage of your current sales/turnover is accounted for by:

Exports   New products/services introduced in the
…………………%   last 3 years?   …………………%

Did you sell goods and/or services to the following countries and areas? (please tick all that apply)

Country	Current Year	2009	2008	2007 and before 2007
Scotland	†	†	†	†
Rest of UK	†	†	†	†
Rest of EU	†	†	†	†
North America	†	†	†	†
Rest of world	†	†	†	†

Did your company engage in any of the following overseas activities?
(please tick all that apply)

Activities	Current Year	2009	2008	2007 and before 2007
Operate a Subsidiary overseas	†	†	†	†
Operate a Sales Office/Agency overseas	†	†	†	†
Operate a Joint Venture overseas	†	†	†	†
Other ………………………………………………… …..	†	†	†	†

Did you receive any assistance from Scottish Development International (or Scottish Enterprise)? (Please tick all that apply)

Assistance with overseas activities/exporting	Current Year	2009	2008	2007 and before 2007
Finding joint venture partners	†	†	†	†
Export training	†	†	†	†
Introductions to potential overseas customers	†	†	†	†
Finding export agents and/or distributors	†	†	†	†
Developing an international trade strategy	†	†	†	†
Exhibiting at trade fairs	†	†	†	†
International marketing	†	†	†	†
Other ………………………………………………… ..	†	†	†	†

4.10.   <u>Data</u>

Table 4.5 shows the results from the collected data, with for comparison; the number of firms the percentage of firms that exported, the percentage they consist of the firms that do not export and the percentage they consist of the percent that export.

Table 4.5: Statistics on variables created from self made survey 2010

<u>Variables</u>	Number of firms	% that are exporters	% of none exporters	% of exporters
<u>Region</u>				
Forth Valley	17	47.1%	5.8%	5.4%
Lanarkshire	27	40.7%	10.4%	7.4%
Fife	8	62.5%	1.9%	3.4%
Glasgow	28	60.7%	7.1%	11.4%
Renfrewshire	12	75.0%	1.9%	6.0%
Borders	12	50.0%	3.9%	4.0%
Argyll and the islands	15	26.7%	7.1%	2.7%
Tayside	23	43.5%	8.4%	6.7%
Edinburgh & Lothian	20	65.0%	4.5%	8.7%
Grampian	39	59.0%	10.4%	15.4%
Dumfries & Galloway	10	70.0%	1.9%	4.7%
Aryshire	12	75.0%	1.9%	6.0%
Inverness & East highland	34	23.5%	16.9%	5.4%
Moray	10	40.0%	3.9%	2.7%
Skye and Wester Ross	6	16.7%	3.2%	0.7%
Dunbartonshire	12	75.0%	1.9%	6.0%
Shetland	4	25.0%	1.9%	0.7%
Lochaber	3	0.0%	1.9%	0.0%
Orkney	4	50.0%	1.3%	1.3%
Caithness & Sutherland	3	33.3%	1.3%	0.7%
Innse Gall	4	25.0%	1.9%	0.7%
<u>Industry</u>				
Forestry/agriculture	13	53.8%	3.9%	4.7%
Manufacture of food	21	61.9%	5.2%	8.7%
Manufacture of drink	6	66.7%	1.3%	2.7%
Manufacture of wearing apparel	12	75.0%	1.9%	6.0%
Manufacture of pulp paper	5	80.0%	0.6%	2.7%
Publishing	4	100.0%	0.0%	2.7%
Manufacture of chemicals	2	100.0%	0.0%	1.3%
Manufacture of non metallic mineral	11	45.5%	3.9%	3.4%
Manufacture other machinery	40	65.0%	9.1%	17.4%
Manufacture electrical machinery	11	63.6%	2.6%	4.7%
Manufacture medical instruments	7	57.1%	1.9%	2.7%
Manufacture other transport equipment	4	50.0%	1.3%	1.3%

Variables	Number of firms	% that are exporters	% of none exporters	% of exporters
Manufacture wood products	9	55.6%	2.6%	3.4%
Electricity/gas supply	3	0.0%	1.9%	0.0%
Construction	15	6.7%	9.1%	0.7%
Wholesale trade	36	33.3%	15.6%	8.1%
Hotels and restaurants	6	0.0%	3.9%	0.0%
Auxiliary transport activities	10	20.0%	5.2%	1.3%
Auxiliary/ financial	6	16.7%	3.2%	0.7%
Renting machinery	5	20.0%	2.6%	0.7%
Other business activities	57	63.2%	13.6%	24.2%
Education	6	16.7%	3.2%	0.7%
Other service activities	9	22.2%	4.5%	1.3%
Other mining	5	20.0%	2.6%	0.7%
Size of firm				
Employs <10	114	41.2%	43.5%	31.5%
Employs 10-25	60	46.7%	20.8%	18.8%
Employs 25-50	33	54.5%	9.7%	12.1%
Employs 50-180	64	50.0%	20.8%	21.5%
Employs 180+	32	75.0%	5.2%	16.1%
OutwardFDI				
OutwardFDI	43	93.0%	1.9%	26.8%
Graduate percentages				
0-3% graduates	109	33.0%	47.4%	24.2%
3-27% graduates	109	58.7%	29.2%	43.0%
27-55% graduates	43	58.1%	11.7%	16.8%
55%+ graduates	40	57.5%	11.0%	15.4%
Exporting experience				
Management experience selling outside Scotland	159	76.1%	24.7%	81.2%
Management experience working for a firm that had exported	142	72.5%	25.3%	69.1%
Management experience working outside Scotland	149	65.1%	33.8%	65.1%
Management Experience working for a multinational company	144	62.5%	35.1%	60.4%
SDI help measure				
SDI support in last two years	49	89.8%	3.2%	29.5%
Foreign owned				
Foreign owned	13	92.3%	0.6%	8.1%
Innovation				
Process Innovation	84	64.2%	20.1%	36.2%
Blue skies Innovation	31	74.1%	5.3%	15.4%
Product Innovation	94	72.3%	17.4%	45.6%
Age of firm				
Less than 10 year's existence	48	43.8%	17.5%	14.1%
Between 10 and 25 year's existence	89	43.8%	32.5%	26.2%
More than 25 year's existence	166	53.6%	50.0%	59.7%

There are 154 none exporters compared to 149 exporters showing that the survey has managed to not be biased in the responses who answer. There might have been a danger that either the non-exporters or exporters might have decided that the survey questions did not apply to them and decide not to answer the survey.

Table 4.5 shows that across regions there are some definite patterns such as regions featuring a higher agglomeration effect such as 'Edinburgh' of whom 65% are exporters (the region makes up 8.7% of exporters and 4.5% of none exporters); while 60.7% of firms from 'Glasgow' export and 75% of 'Renfrewshire' firms. Regions that are more remote and may have lower agglomeration effects include 'Lochaber' of whom 0% export (the region makes up 1.9% of non-exporters and 0% of exporters); 'Argyll' of whom 26.7% export and 'Skye & Wester Ross' where 25% of firms export. Some sectors seem to be more likely to have exporters such as: 'manufacture of chemicals' where 100% of firms export (making up 1.3% of the exporters) and 'construction' which has a much lower percentage of 6.7% exporters. Additionally, the exporters are older with 59.7% of firms export who 'existed for more than 25 years', compared to 14.1% of firms that 'existed for less than 10 years' and 26.2% of firms that 'existed for between 10 and 25 years'.

Undertaking different types of innovation is done by a higher percentage by exporters than non-exporters such as 30.9% of exporters use 'product innovation' compared to 11.% for non-exporters). This might suggest that there is a positive effect of innovation on exporting. For differences on firm size, of the exporters 16.1% 'employ 180+' much more than those who do not export where only 5.2% of the firms 'employ 180+' suggesting larger firms are more likely to export; 75% of firms who 'employ more than 180 people' exports.

The variables that seem to be associated with exporting are the various types of management experience, being foreign owned, SDI support and Outward FDI. Additionally all type of innovation seem to be associated with exporting.

4.11. Variables used in Model 3 (a) and (b)

4.11.1. SDI help: involvement from public sector

SDI uses a variety of methods, such as general assistance; finding joint venture partners, Export training, introductions to potential overseas customers and trade fairs; finding export agents; developing international trade strategy; and international marketing. These could succeed by improving the contacts a firm has and knowledge of exporting.

The data shows that 89.8% of firms that have received SDI help in the last two years are exporters. Overall the hypothesis is that: receiving SDI help should improve the ability of the firm to export.

4.11.2. Age of firm

There are different beliefs about the stages that a firm needs to go through to be an exporter. The Uppsala internationalization theory such as Johanson and Vahlne (1977) emphasizes that the distinct knowledge and competencies typically related to product adaptation, marketing and distribution that are required for export success. An incremental process is used to gain the right level of experience to allow firms to export. The older the firm, the more established and access to better resources to allow it to export. It is also might pick up effects such as the firm having a sufficiently developed product or saturated demand in the domestic market. Alternatively there is a growing amount of literature theory on born global firms; these are firms that have been exporting since their inception which suggests that age of firm effects may not be as straightforward as predicted by the Uppsala internationalisation theory.

Table 4.5 shows a higher percentage of firm's that have 'existed for more than 25 years' are exporters of 53.6% compared to 43.8% for firms that 'have existed for less than 10 years'.

Therefore the hypothesis is that: if a firm has existed for a short time it maybe less stable and have fewer skills to export however it might be open to change with a clear managerial direction to be born global; this will lead to an unknown increase in the propensity to be an exporter.

4.11.3. Whether the management team had previous experience of exporting

Firms may decide to behave as an exporter because the firm's management has already been involved in exporting. Most recently, Sala and Yalcin (2012) examine for Danish firms the impact of managers' international experience together with other managerial characteristics on the likelihood that the firm starts exporting. Finding that in the selection of firms into international markets "managerial inputs" are important.

The data shows a strong association with higher levels of management experience for example firms that have 'Management experience selling outside Scotland' 76.1% export while the measure with lowest value is 'Management Experience working for a multinational company' of which 62.5% are exporters.

Therefore the hypothesis is that: firms that have management experience abroad will be more likely to export.

4.11.4. Absorptive capacity measures

Other problems that firms have in exporting are their "absorptive capacity". This was defined by Cohen and Levinthal (1990) as "ability to recognize the value of new information, assimilate it and apply it to commercial ends" and "these abilities collectively constitute what we call a firm's 'absorptive capacity' ". To adapt and penetrate new markets and new ways of organization such as exporting where they have little experience, firms must find and assimilate new knowledge. These absorptive capacities can be measured in many different ways, for example Cohen and Levinthal originally suggest a measure of how the firm innovates. This could be the firms that use their own research and development rather than buying the R&D of other firms have more capacity.

Vinding (2006) shows some of the components of absorptive capacity that have been put forward as measures of absorptive capacity including human capital, external knowledge and innovation. Zahra and George (2002) extended all the concepts of absorptive capacity to include knowledge acquisition and assimilation capabilities and knowledge transformation and

exploitation. This means that the greater a firm's exposure to diverse and complementary sources of knowledge and ability to adapt the easier it should be for the firm to break into exporting. For example, if a firm can work with other firms or with universities this shows they have the exposure to new knowledge and that they have the ability to apply innovation and it gives them a new knowledge base. Experience absorptive capacity comes in the form of the amount of innovation that a firm directly takes part in. Other definitions of "absorptive capacity" are the requirement for human capital which could be measured in terms of percentages of graduates.

Absorptive capacity has been found to be significant as a determinant of exporting. Harris and Li (2009) model the determinants of exporting including absorptive capacity and innovation information to help find the "the role of knowledge-based assets in overcoming barriers to internationalisation" within the UK. The data used is the CIS 5 covering innovation data from 2002-2005 and the Annual Respondents Database. Using a probit model the significant determinants of exporting included; labour productivity, absorptive capacity measures, human capital, innovation measures and the size of the firm.

Factor analysis has been used on some of the absorptive capacity measures as a way to reduce the number of observed variables into factors which will show the variability of the observed variables. These included exploiting external sources of .knowledge; networking with external bodies at the national level; implementing new organizational structures and HRM strategies; building up partnerships with other enterprises or institutions at the international level; and acquiring and absorbing codified scientific knowledge from research partners. It was found that these were good measures of absorptive capacity and also that they were relevant in reducing entry barriers into export markets in the model. In summary, a firm with more absorptive capacity has more ability to respond to change and export. Factor analysis has been used on some of the absorptive capacity measures as a way to reduce the number of observed variables into factors which will show the variability of the observed variables.

The method of factor analysis used here involves rotating the loading of the variables and the loading matrices are given in full in the appendix. The matrix is rotated to improve the interpret ability of the factors. Rotation maximizes the loading of each variable on one of the

extracted factors whist minimizing the loading on all other factors. Rotation works through hanging the absolute values of the variables while keeping their differential values constant.

The Kaiser-Meyer-Olkin measure for each variable is reported in the appendix. This measure is used to suggest the level of sampling adequacy of the factors and varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to sum of correlations indicating diffusion in the patter of correlations. Kaiser (1974) recommends accepting values greater than 0.5. 0.5 is acceptable, with values between 0.5 and .07 mediocre, between 0.7 and 0.8 are good, between 0.8 and 0.9 great and values are above 0.9 are exceptional. The values in the appendix show that the KMO statistic was in acceptable boundaries apart from Business direction which was only at 0.4.

The variables created for factor analysis included management techniques, business direction questions, management questions, culture questions, product and services questions, information knowledge questions and source of knowledge; as shown below.

4.11.5.   Business direction measure

Depending where a firm is in its business cycle it may decide it needs extra markets to develop in. For example, a new firm would normally try to grow in the domestic market before expanding. However, this is not always true as there are born global firms that export from their inception with their main market being exporters. If a firm says that it is looking to expand in new markets and that domestic markets are saturated by their product/service, this might be another sign that firms are going to export.

Questions to be rated:
The main problems of the business are obtaining customers and delivering the product or service.
The Company has sufficient customers satisfies them sufficiently with its products or services.
The decision currently facing management is to keep Scottish activities stable and profitable (rather than to expand)
The key problems facing the Scottish company are how to grow rapidly and how to finance this growth.
The answers to the above survey questions were converted into factors. Table A6 shows the rotated loadings. The hypothesis is that: a firm that has a business direction to expand should have a higher propensity to export.

4.11.6. Culture measure

The culture measure identifies some values such as whether there is a culture of openness at the firm. This measure should identify whether there is too much bureaucracy which stifles creativity at the firm.

Questions to be rated:
There is a strong team spirit at all levels of the organisation
The organization is not bureaucratic
There is a feeling of openness in this organization
The culture in this organisation promotes change
The majority of employees get useful feedback about their work/performance

The answers to the above survey questions were converted into factors. Table A8 shows the rotated loadings.

The hypothesis is that: a strong culture for change will increase the propensity to export.

4.11.7. Products and services measure

The products and services measure is closely related to an innovation type question. That is to discover how innovative the firm has been in the past and whether or not the firm's products should have a competitive advantage over other products. If the firm's products are more advanced than other firm's this suggests that the firm will find it easier to export.

Questions to be rated:
We regularly compare our products and services with those of our competitors
We are committed to making our existing products and services obsolete by introducing new ones
Our products and services use better technology than our competitors
Our products/services have a high level of technology built into them

The answers to the above survey questions were converted into factors. Table A4 shows the rotated loadings.

4.11.8. Source of Knowledge measure

The source of knowledge measure is used to find out where firms gain their knowledge from. If firms rely on innovation sourced from other firms it indicates that a firm has low abilities in absorptive capacity. A firm that has many partnerships from a variety of sources such as universities or the government indicates that that firm has a high level of absorptive capacity and therefore more ability to adapt to exporting. Additionally the firms were asked if they co operated internationally. Co operating internationally should increase the propensity to export.

Sources of information questions to be rated:
Within your enterprise or enterprise group
Suppliers of equipment, materials, services, or software
Competitors or others enterprises in your industry
Consultants, commercial labs, or private R&D institutes
Universities or other higher education institutions
Government or public research institutes
Conferences, trade fairs, exhibitions
Scientific journals and trade/technical publications
Professional and industry associations
Technical, industry or service standards
Clients or customers

Co operation partners questions to be rated:
Other enterprises within your enterprise group
Suppliers of equipment, materials, services, or software
Competitors or other enterprises in your industry
Consultants, commercial labs, or private R&D institutes
Universities or other higher education institutions
Government or public research institutes
Clients or customers

The answers to the above survey questions were converted into factors. Tables A1 show the rotated loadings. Therefore the hypothesis is that: using more international co-operation partners will increase the propensity to export.

4.11.9. Management Measure

The purpose of the management questions is to see how innovation directed the management team is and whether they try to be a management that is more adaptive. Firms that have a more innovation directed management and are more adaptive should have more absorptive capacity and this should increase the propensity to export. Ruzzier et al. (2007) found that internationalization was positively related to the international experience of the firm's management team.

Questions to be rated:
Management fosters creative thinking and innovation in the company
If the company is performing well, change is still a priority
Our top managers continually like to try new ways of doing things
Management encourages everyone in the organization to come up with new ideas.
The management team take time to think constructively/creatively about the future

The answers to the above survey questions were converted into factors. Table A5 shows the rotated loadings.

Management technique measure

Management techniques indicate how a firm is run. Some management practices such as Total Quality Management include a wide variety of factors such as committed leadership, customer involvement and cross-functional production design; while the ISO-9000 series provides the basis for the third party certification of a company's quality system. Using any of the methods in the table below could improve a firm's absorptive capacity. Therefore using any of them should improve the propensity to export.

Questions to be rated:
Total Quality Management (TQM)
Continuous Improvement
Balanced Scorecards
Lean
Total Preventative Maintenance (TPM)
ISO 9001
Investors in People (IiP)
European Business Excellence Model
ISI14001

The answers to the above survey questions above were converted into factors. Tables A3 and A2 show the rotated loadings used to make the variables.

The hypothesis is that: firms with managers that promote creativity may have a higher propensity to export. Additionally for the management techniques, Lean may have negative effects on the propensity to export if it disrupts the firm.

4.11.10. <u>Information knowledge measure</u>

The information knowledge measure attempts to understand how information and knowledge are used in the firm. A firm that can spread information and knowledge more easily should be able to adapt more easily to a process such as exporting. A firm with those characteristics should find it easier to export.

Information Knowledge questions to be rated :
Information/knowledge is effectively managed and used throughout the organization
Information/knowledge is held at all levels in the organization
Efforts are made to share information/knowledge across the organization
Lessons learned from daily experiences and projects are captured and disseminated
New information/knowledge is effectively incorporated within the processes and routines within
Information/knowledge about competitors is effectively managed within the organization

The answers to the survey questions above were converted into factors. Table A7 shows the rotated loadings.

The hypothesis is that: more effective ways of managing knowledge will lead to a higher propensity to export.

4.11.11.   Innovation Measure

The innovation measure is used to check if a firm has improved any aspects of the way the firm innovates in the past 3 years. Any of these measures could improve absorptive capacity. For example, increased training for innovation activities could make workers more adaptable to new business methods such as exporting.

Innovation measure (During the 3 year period 2008-2010 did your firm engage in any of following innovation-related activities?)
Acquisition of machinery equipment & software for innovation
Training for innovation activities
R&D that was done by another company outside the enterprise
All forms of Design for innovation activities
R&D that took place within the Scottish enterprise
Purchase of external knowledge for innovation
Spending on the Market introduction of innovations (e.g., advertising, market research)

The answers to the survey questions above were converted into factors. Table A9 shows the rotated loadings.

The hypothesis is that: some innovation measures will be more powerful than others such as acquisition of machinery.

4.11.12.   Innovation

Innovation in a firm could change the way that the firm is able to start exporting. Innovation drives improvements in the product allowing it to compete better in international markets. Moving into other markets allows the firms to earn higher returns from their investment in innovation. Another reason that innovation is important is that changing products to suit new foreign market tastes will allow those products to be more successful; Modifying products is important in breaking into foreign markets with different types of products needed to take into account the variety of demands in international markets.

An example of possible effects of measuring innovation comes from Rodriguez and Rodriguez (2005), who compared non-exporting and exporting Spanish manufacturing firms in 1998 and 1999. They used logit models to estimate the determinants of exporting including product innovations, patent and process innovations as dummy variables. Their finding was that,

"product innovations, patents and process innovations positively and significantly affect both the decision to export and the export intensity." As innovation could be a key driver of exports, questions in the survey include production innovation, process innovation and product innovation developed by the company themselves. Innovation could make a firm's products or services better, making them more suitable for exporting and innovation has been found to be significant in many other studies. Love and Roper (2001) find that plants within-house R&D capability are more likely to export and Constantini and Melitz (2008) find that innovation precedes exports.

The most recent papers on UK innovation and exporting include: Girma et. al. (2008); Harris and Li (2009, 2010) and Harris and Moffatt (2012). Harris and Moffatt uses data from the UK Community Innovation Survey (CIS) covering 2002-2008 for a selection of UK firms here, "Spending on R&D in manufacturing had a much larger impact on the probability of exporting which implies that spending on R&D was not simply to boost the probability of producing new goods and services, but also to improve the establishment's knowledge assets which would in turn help it break down barriers to international markets."

The data in Table 4.5 of the means of the industry some of the differences are that process innovation 60.8% are exporters and for product innovation 73.0% are exporters.

Therefore the hypothesis is that: blue skies innovation, process innovation and product innovation may all improve the firm's ability to export.

4.12.   <u>Model 1</u>

A stepwise probit[1] was run on the variables contained in the GCS to predict exporting. If the p value was above 0.15 the variable was dropped if it was below 0.10 it could re enter the model.

$$y_i = X_i \, B + E_i \qquad\qquad\qquad (4.1)$$

$y_i = 1$ if firm exports
        0 if firm does not export

$X_{i\ is}$ the set of variables that are thought to determine the firm's propensity to export.

A model specification error may occur in the probit if relevant variables are omitted from the model, or when one or more irrelevant variables are included in the model, substantially affecting the estimated coefficients of regression. To detect this error the linktest[2] is used as explained in the Stata manual, "The idea behind the linktest is that if the model is properly specified, one should not be able to find any additional predictors that are statistically significant except by chance." The linktest works by creating after the probit regression command a variable of the linear predicted value and the linear predicted value squared, and then the model is refit using these two variables as predictors. The variable of squared prediction should not be significant if the model is specified correctly and so can be tested using its p-value in the fitted model which is reported in the results as the test of omitted variables[3]. At p values greater than 0.15, omitted variables in the model (specification error) can be rejected at the 15% level of significance.

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[1] The stata command sw probit was used
[2] The stata command linktest was used
[3] H_0: omitted variables in the model

4.13.   <u>Model 1 Results</u>

The marginal effect is used; the coefficient needs to be transformed into a marginal propensity to export. This result is shown in the dy/dx column.

Table 4.6: Model 1 results

Variable	dy/dx	z- value
<u>Industry</u>		
Manufacture of food	0.106*	1.82
Forestry/agriculture	0.114***	1.96
Manufacture of chemicals	0.182**	2.37
Publishing	0.240***	3.38
Wholesale trade	0.136***	2.42
Education	0.169***	2.35
Other business activities	0.373***	11.59
Renting machinery	0.200***	2.4
Auxiliary/ financial	0.269***	4.51
Auxiliary transport activities	0.294***	5.98
Hotels and restaurants	0.344***	6.77
Wholesale trade	0.094***	2.45
Manufacture wood products	0.126***	1.68
Manufacture other transport equipment	0.325***	3.93
Manufacture medical instruments	0.287***	3.46
Manufacture electrical machinery	0.204***	2.71
Manufacture other machinery	0.207***	4.49
<u>Region</u>		
Moray	-0.128**	-2.08
Shetland	-0.322***	-4.86
Innse Gall	-0.176***	-2.16
Grampian	0.059***	1.68
Dumfries & Galloway	0.143***	2.26
<u>Employment</u>		
Employs less than ten	-0.069***	-3.01
<u>FDI/foreign owned /single enterprise</u>		
Outward FDI	0.267***	9.69
Foreign owned	0.148**	2.47
Single enterprise	0.152***	5.11

Number of obs   =   2277
LR χ^2 (26)   =   338.35
Prob > χ^2 =   0.0000
Log likelihood = -1392.2286
Pseudo R^2 =   0.1083
H_0: omitted variables =0.633
Correctly specified = 67.15%
$\hat{P}$ =0. 43

*/**/*** indicates significant at 10/5/1% levels

Table 4.6 shows that for industry effects this probit model shows a wide variety of statistically significant results, with for example, hotels and restaurants having a 34.4% increases in the propensity to export while other business activities has a 37.3% increase.

The model shows many effects for different regions, such as 'Dumfries and Galloway' which has a 14.3% increase in the propensity to export, possibly due to agglomeration effects and transport links. Regions that might be hypothesised to have poor transport links, being further from large cities, include 'Shetland' which has a -32.2% propensity to export and other remote areas such as 'InnseGall' which has a -17.6% effect..

Other results that were significant include 'single enterprise' which increases the propensity to export by 15.2% effect, which could be due to single enterprises therefore is less likely to be part of a firm's supply chain to other enterprises run by the same firm in the UK. Additionally, 'Outward FDI' has a 26.7% increase in the propensity to export, this result is intuitive as more links in foreign countries suggests that a firm is more outward looking and also that the firm will have more contacts outside the country to allow it to export. As expected a smaller size firm means that the propensity to export is reduced with "Employees of less than ten" having a reduced propensity to be an exporter of -6.9%. Smaller firms may find it harder to export and also not be interested in exporting as they are more interested in growing the company.

To check the validity of model 1, tests were made on the data, as explained previously in section 4.10 a link test [4] and an estat classification test which determines what proportion of results are predicted correctly. The linktest is not significant as the p-value of the linear predicted value squared being put into the model is 0.633 and is greater than 0.1, suggesting that the model has not been misspecified. 67.15% are correctly classified by the probit model and a low pseudo R^2 of 0.11 suggests that the model can be improved as the model does not capture all the information required to be able to predict whether a firm becomes an exporter or not; meaning that there are several factors that have not been accounted for. To improve this model more information is required. Economic theory suggests other variables that were not in the GCS 2006 that could be asked and this step is done with the survey in 2010 which has the advantages of being more recent and has more questions asked.

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[4] The stata command linktest was used

4.14.   Model 2

The aim of model 2 was to apply the findings on model 1 such as the relevance of industry and region and employment onto the new sample of the survey 2010 for a direct comparison.

Model 2 was a stepwise regression removing firms at a probability level of 0.15 and entering the model at a probability level of 0.1. 303 firms from the original GCS 2006 replied to the survey and it was decided to compare the results of model 1 to the new data with a probit using the same variables.

$$y_i = A_0 + X_i B + E_i \qquad\qquad (4.2)$$

Where
y_i = 1 if firm exports
    0 if firm does not export

$X_{i\ is}$ the set of variables that are thought to determine the firm's propensity to export. This information was only taken from the survey 2010.

X_i contains size band dummy variables, region band dummies, industry band dummies, foreign owned dummy and whether the firm has any outward FDI. The difference between probit 2 and probit 1 is that it uses different data and also due to the nature of the questions in the survey single enterprise was not asked as a question. This is that the data used is the self made survey 2010 rather than GCS 2006. A full list of the variables entered in the model in provided in Table 4.3.

4.15.   Model 2 results

Table 4.7: Model 2 results

Variable	dy/dx	z- value
Industry		
Manufacture wood products	0.441***	5.24
Manufacture of food	0.464***	6.9
Manufacture other machinery	0.486***	7.13
Glasgow	0.183	1.59
Renfrewshire	0.306	1.98
Manufacture medical instruments	0.417**	4.2
Forestry/agriculture	0.441***	5.55
Manufacture electrical machinery	0.441***	5.16
Manufacture of wearing apparel	0.474***	7.06
Manufacture of drink	0.484***	8.21
Manufacture of non metallic mineral	0.351*	2.69
Manufacture of pulp paper	0.486**	7.33
Other business activities	0.407***	4.61
Wholesale trade	0.279**	2.58
Region		
Edinburgh & Lothian	0.207	1.69
Grampian	0.206**	2.09
Dumfries & Galloway	0.389***	3.76
Aryshire	0.286**	2.07
Dunbartonshire	0.353**	2.96
Size of firm		
Employs <10	-0.267***	-2.91
Employs 10-25	-0.207*	-1.99
Employs 50-180	-0.236**	-2.24
Outward FDI		
OutwardFDI	0.523***	8.62
Number of obs = 294[5]		
LR χ^2 (23)= 117.04		
Prob >χ^2= 0.0000		
Log likelihood = -145.15626		
Pseudo R^2 = 0.29		
H$_0$: omitted variables = 0.831		
Correctly classified 72.45%		
$\hat{P}$ = .50		

*/**/*** indicates significant at 10/5/1% levels

To begin, Table 4.7 shows that this model has a selection of statistically significant results, for example, 'manufacturing of other machinery' is 48.6% more likely to export and firms that industry is 'manufacture of food' has a 46.4% increase in the propensity to export. This might be as these types of firms have products that are more easy to standardise and transport, being more conducive to exporting than services.

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[5] Due to estimability problems 9 observations were dropped from the orignal 303 firms from the survey

Effects for region in the model included 'Edinburgh & Lothian' which had a 20.7% increase in the propensity to export, though this effect was not significant at the 10% level, and 'Dumfries & Galloway' with a 38.9% increase in the propensity to export significant at the 1% level. These two effects are possibly due to the high levels of agglomeration and good transport links.

Other results that were significant include 'Outward FDI' which increases the propensity of a firm to export by 52.3%, which was predicted, as the extra links to foreign countries and extra options to sell, if for example the firm had a sales office.. The model also shows that smaller firms are less likely to export with firms with 'less than ten employees' having a reduced propensity to export of -26.7% and 'employs 10-25' having a -20.7% effect on the propensity to export; both these results are in line with model 1. However, slightly against expectations, 'employs 50-180' also had a negative effect, of -23.6%.

The same process as model 1 was used with a link test[6] and an estat classification test. The linktest is not significant as the p-value of the linear predicted value squared being put into the model is 0.831 and is greater than 0.1, suggesting that the model has not been misspecified. 72.45% (compared to 67.15% for model 1) are correctly classified by the probit model and a pseudo R^2 of 0.29 (compared to 0.11 for model 1) suggests that the model works slightly better on this data source. This means that though the classification is better than probit 1 there are still factors that have are not accounted for; more information is needed to make the model perform better, this is done in the next stage by adding the extra variables from section 4.9 to make a better model.

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[6] The stata command linktest was used

4.16.   Model 3 (a) and (b)

Model 3 examines the self-made survey 2010 using the extra variables to make a model with more explanatory power based on economic theory. Model 3 (a) and (b) are stepwise regressions removing firms at a probability level of 0.15 and entering the model at a probability level of 0.1. The purpose of this probit is to use all the information in the survey to improve upon the previous probit model.

$$y_i = A_0 + X_i B + E_i \qquad\qquad (4.3)$$

$y_i = 1$ if firm exports
    0 if firm does not export

$X_{i \ is}$ the set of variables that are thought to determine the firm's propensity to export. This information was only taken from the self made survey 2010. It contains the same variables as in the GCS survey such as size band dummy variables, region band dummies, industry band dummies, headquarters of the firm dummy and whether the firm has any outward FDI dummy. It also includes absorptive capacity measures such as business direction, culture, management and sources of information knowledge. The full list of the variables entered in the model is provided in Table 4.3 and a list of definitions of those variables in Table 4.1.

As 'previous exporting' is a powerful variable, with a strong effect of firms who have been exporters having the ability to export again, it is interesting to examine the results of the model with and without previous exporting. For this reason the model is done (a) without previous exporting and (b) with previous exporting. Model 3 (a) results are shown in Table 4.8 and model 3 (b) results are shown in Table 4.9.

4.17. Model 3 (a) Results

Table 4.8: Model 3 (a) results

Variable	dy/dx	z- value
Region		
Lanarkshire	-0.390***	-3.29
Industry		
Auxiliary transport activities	-0.600***	-12.12
Manufacture other machinery	0.250**	2.55
Manufacture of wearing apparel	0.277	1.94
Management experience		
Management experience selling outside Scotland	0.575***	8.79
Absorptive capacity		
Need to keep business stable	-0.148***	-3.09
Strong management factor	-0.116**	-2.07
Strong culture factor	0.130**	2.21
Strong TPM, IS09001, continuous improvement use for one year	0.151**	2.5
Strong national co-operation public domain source	-0.106**	-2
Strong international co-operation consultant/public research	0.147**	1.86
Strong int. co-operation between client and supplier	0.215***	3.75
Outward FDI		
OutwardFDI	0.510***	6.83
SDI help		
SDI help in the previous 2 years	0.396***	4.2
Innovation		
Production innovation	0.371***	3.21
Process innovation	-0.270*	-1.77
Age of firm		
Firm existed for more than 25 years	0.165*	1.98
Number of obs = 294[7]		
LR χ^2 (17)= 212.03		
Prob > χ^2 = 0.0000		
Log likelihood -97.659617		
Pseudo R^2 = 0.5205		
H_0: omitted variables = 0.942		
Correctly classified 83.67%		
$\hat{P}$ = .54188313		

*/**/*** indicates significant at 10/5/1% levels

Firstly, Table 4.8 shows many industry effects include 'manufacture of other machinery' increasing the propensity to export by 25.0%, while 'auxiliary transport activities' has a -60% effect on the propensity to export.

The absorptive capacity variable 'need to keep business stable', is negative with -14.8% effect on the propensity to export, understandably because for firm's in that situation a major change

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[7] Due to estimability problems 9 observations were dropped from the original 303 firms from the survey

such as beginning to export might drain some of the resources of the 'company. Interestingly, "Strong use of TPM, IS09001 and continuous improvement for year' is positive with a 15.1% increase in the propensity to export, possibly due to an increase in the firm's absorptive capacity and ability to change. The absorptive capacity of the firm is shown by the sources of co-operation with the 'Strong national public domain source' having a -10.6% effect on propensity, while more international co-operation, such as 'Strong int. co-operation between client and supplier' having a 21.5% increase in the propensity to export, and 'international co-operation between consultants and customers' had a 14.7% increase. Additionally, having a strong culture, such as a strong team spirit increased propensity, though unexpectedly strong management had a negative effect.

Perhaps unexpectedly, 'process innovation' is negative with a -27.0% effect on propensity to export; this effect could be due to the drain of resources and disruption on firms, the innovation may have moved the firms in a direction away from exporting. However, as expected, 'product innovation' had a positive effect of 37.%, as innovation leading to better products should enable the firms to compete more easily internationally. Perhaps most importantly, 'SDI support' is positive with a 39.6% increase in propensity to export, meaning that the support programmes provided by SDI increased the propensity of firms to export. This shows strong justification for the SDI programme, which as discussed later on has important policy implications.

Another expected effect was found to be significant with firms that had 'existed for more than 25 years' having a 16.5% increase in the propensity to export. This might be as the firms are more developed and are more stable, meaning that they are more likely to be able to have the necessary experience to export which is in line with the expectations of the Uppsala theory of internationalization, whereby firms learn the ability to and become more interested in exporting in a more incremental fashion.

Lastly, for this model the test for omitted variables is not significant as the p-value of the linear predicted value squared being put into the fitted linktest model is 0.43 and is greater than 0.1, suggesting that the model has not been misspecified. 84.35% (compared to 70.07% for model 2) are correctly classified by the probit model and a pseudo R^2 of 0.50 (compared to 0.23 for model 2) suggests that the model is much improved by using the extra variables. In

particular the absorptive capacity variables show extra explanatory power. This model is improved upon again in the next model with extra explanatory power, by using the variable previous exporting.

4.18. Model 3 (b) Results

Table 4.9: Model 3 (b) results

Variable	dy/dx	z- value
Previous exporting		
Previous exporting	0.855***	15.38
Region		
Lanarkshire	-0.487***	-4.12
Fife	0.478**	5.19
Innse Gall	0.482*	5.75
Dumfries & Galloway	0.392*	2.85
Edinburgh & Lothian	0.450***	4.52
Industry		
Manufacture wood products	-0.347	-1.98
Education	-0.543	-6.82
Construction	-0.609**	-7.96
Auxiliary transport activities	-0.560**	-7.17
Manufacture other machinery	0.304**	2.63
Number of employees		
50-180 employees	-0.239	-1.7
Management experience		
Management experience selling outside Scotland	0.476***	4.44
Management experience working outside Scotland	0.408***	3.33
Absorptive capacity		
Need to keep business stable	-0.217***	-3.11
Strong public domain sources	0.206***	2.86
Strong int. co-operation between client and supplier	0.255***	3.19
SDI help		
SDI help in the previous 2 years	0.485*	2.63
Innovation		
Product innovation	0.504**	3.48
Process innovation	-0.549***	-4.29
Number of obs $=$ 294[8]		
LR χ^2 (20) $=$ 296.97		
Prob $> \chi^2$ $=$ 0.0000		
Log likelihood $= -55.189634$		
Pseudo $R^2 = 0.73$		
H_0: omitted variables $= 0.35$		
Correctly classified 91.50%		
$\hat{p}$ $=.518$		

*/**/*** indicates significant at 10/5/1% levels

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[8] Due to estimability problems 9 observations were dropped from the original 303 firms from the survey

Table 4.9 shows the results of model 3(b), for industry there are several significant variables such as, 'manufacture of other machinery' which has a 30.4% increase in propensity to export and 'construction' which has a -60.9% propensity to export. For regions, the model shows that 'Lanarkshire' has a -48.7% effect on the propensity to export, while 'Edinburgh & Lothian' has a 45% effect; these region effects are possibly due to agglomeration or better transport links.

There are some similarities in model 3 (a) and (b) as should be expected as there is only previous exporting as an extra variable in the model. For example, the 'need to keep business stable' is also negative in this model with a -21.7% propensity to export. However, SDI support is no longer as significant, though still enters the model. Also Strong management techniques for one year', 'strong culture' and 'strong management' are no longer significant. This model has as significant management experience in areas linked to exporting, such as 'experience selling abroad' with a 47.6% increase, which was also significant in model 3 (a), and 'working abroad' which has a 40.8% increase and was not significant in model 3 (a). Both these variables show that the experience of making contacts abroad helps to increase the propensity to export.

The largest difference between model 3(a) and 3(b), is of course the extra variable 'previously export', which has a large 85.5% increase in the propensity to export. This is presumably a sign that the firms have already invested in exporting and can maintain it. Therefore to stop exporting might require a change of business direction; otherwise the company should already have the knowledge to export and contacts abroad to export to.

The linktest is not significant as the p-value of the linear predicted value squared being tested in the fitted model is 0.35 and is greater than 0.1, suggesting that model 3(b) has not been misspecified. 91.5% are correctly classified (the highest percentage across the models) by the probit model and a pseudo R^2 of 0.73 (the highest value across the models) suggests that this is the best model.

4.19.   <u>Conclusion</u>

This chapter has sought to use the GCS 2006 and a further survey to find the characteristics that allow firms to export. As the GCS is limited in the information it has such as the lack of information on knowledge based assets and absorptive capacity measures the survey was necessary.

The models have shown:

a) What factors determine whether a firm becomes an exporter across Scotland

b) How to construct a survey including more qualitative questions

c) How to build better models based on theory that has a better fit.

The extra information gathered for each firm by the survey created a much better probit model, as measured by higher pseudo R^2 and higher classifications, showing that as expected variables such as absorptive capacity measures, management experience and innovation measures play an important role in changing the propensity to export of a firm. Additionally the models have been tested for model specification error with the stata command linktest and were not significant at the 15% level of significance, suggesting that the models were not misspecified. The models, while concentrating on the determinants of exporting do not explain some of the other key issues that are of interest such as the timeline of firms becoming exporters, or their reasoning behind exporting. This will be tested in Chapter 5 by asking questions to the firms through interviews, with those questioned based on firms with similar propensities to export based on probit 3 (b).

Additionally, there were some questions that could have been asked differently, but there were constraints on the size of the survey. This leads onto other questions such as e- commerce and other variables. This was tested in Chapter 6 using the EIM/GDCC survey which was a survey applied to Europe SME's 2009 which is also used to give extra support to the results here.

4.20.   Policy implications

Model 3 (a) and 3 (b) are the two best models, the implications are that better sources of innovation, such as stronger national co-operation on public research and public domain sources, use of public domain sources and strong international co-operation between client and supplier, increase the propensity of firms to export. Additionally using management techniques such as total product management increase the propensity of firms to export in model 3 (a). Both models suggest that gathering management experience for workers outside Scotland, increases the propensity to export. Therefore encouraging workers and managers who have these types of experience could help increase the likelihood of firms exporting; this could be done by specific policies, such as hiring those types of workers. Another possibility would be devising a program to develop experience of managing/working in other countries as part of the education system. As SDI support for two years was found to be significant in model 3(a), suggesting that SDI support significantly increases the propensity of firms to export and that SDI support is from a policy standpoint, proving it's value.

4.21.   Comparison of model 1, 2 and 3(a) and (b)

This comparison is to show the differences between the data, in Table 4.10, partly to check for inconsistencies with the results. Fortunately there are no contradictions across the models, the variables that are significant are not negative in one model and positive in the other, which shows the consistency of the models even across the different data samples, which are of a different size (303 compared to 2288) and from a different time period (2010 compared to 2006).

The main difference between model 1, that uses the GCS 2006, and the other models is that the variable 'foreign owned' is no longer significant, which might partly be due to the different way the questions were asked. Also the variable 'single enterprise' was not entered into any models apart from model 1 as a similar question was not asked in the self-made survey 2010. Model 3(b), which is taken to be the best model, had one main difference with the other models, with 'outward FDI' not being significant even though model 2 and 3 (a) which uses the same data, find the variable to be significant.

Interestingly, whereas model 1 find the variables for lower number of employees to be negative and significant, model 2 and model 3 (b) finds firms that have 'employees between 50-180' to have a negative effect on the propensity to export, which is unexpected as it was hypothesised that larger firms would have an advantage across all models and this variable was not significant in model 3 (a). The importance of strong products to increase the propensity to export is expressed in product innovation being significantly positive in model 3 (a) and model 3(b).

Model 3 (b) is the best model as it correctly classifies the highest and has a much higher pseudo R^2 value. The comparison in Table 4.10 shows that the results support each other and also that through each stage a better model has been created by using variables based on theory.

Table 4.10: Comparison of model 1, 2 and 3(a) and 3(b)

Variables	Model 1		Model 2		Model 3 (a)		Model 3 (b)	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Previous exporting								
Exporting in the previous year	-----		-----		-----		0.855***	15.38
Region								
Moray	-0.128**	-2.08	n/s		n/s		n/s	
Shetland	-.322***	-4.86	n/s		n/s		n/s	
Innse Gall	-.176***	-2.16	n/s		n/s		0.482*	5.75
Grampian	0.059***	1.68	0.206**	2.09	n/s		n/s	
Dumfries & Galloway	0.143***	2.26	0.389***	3.76	n/s		0.392*	2.85
Edinburgh & Lothian	n/s		0.207	1.69	n/s		0.450***	4.52
Lanarkshire	n/s		n/s		-0.390***	-3.29	-0.487***	-4.12
Aryshire	n/s		0.286**	2.07	n/s		n/s	
Dunbartonshire	n/s		0.353**	2.96	n/s		n/s	
Fife	n/s		n/s		n/s		0.478**	5.19
Industry								
Education	0.169***	2.35	n/s		n/s		-0.543	-6.82
Other business activities	0.373***	11.59	0.407***	4.61	n/s		n/s	
Renting machinery	0.200***	2.4	n/s		n/s		n/s	
Auxiliary/ financial	0.269***	4.51	n/s		-0.600***	-12.12	n/s	
Auxiliary transport activities	0.294***	5.98	n/s		n/s		-0.560**	-7.17
Hotels and restaurants	0.344***	6.77	n/s		n/s		n/s	
Wholesale trade	0.136***	2.42	0.279**	2.58	n/s		n/s	
Manufacture wood products	0.126***	1.68	n/s		n/s		-0.347	-1.98
Manufacture other transport equipment	0.325***	3.93	n/s		n/s		n/s	
Manufacture medical instruments	0.287***	3.46	0.417**	4.2	n/s		n/s	
Manufacture electrical machinery	0.204***	2.71	0.441***	5.16	n/s		n/s	
Manufacture other machinery	0.207***	4.49	n/s		0.250**	2.55	0.304**	2.63
Manufacture of chemicals	0.182**	2.37	n/s		n/s		n/s	
Publishing	0.240***	3.38	n/s		n/s		n/s	
Manufacture of non metallic mineral	n/s		0.351*	2.69	n/s		n/s	

Variables	Model 1		Model 2		Model 3 (a)		Model 3 (b)	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Manufacture of food	0.106*	1.82	n/s		n/s		n/s	
Forestry/agriculture	0.114***	1.96	0.441***	5.55	n/s		n/s	
Manufacture of drink	n/s		0.484***	8.21	n/s		n/s	
Manufacture of wearing apparel	n/s		0.474***	7.06	0.277	1.94	n/s	
Manufacture of pulp paper	n/s		0.486**	7.33	n/s		n/s	
Construction	n/s		n/s		n/s		-0.609**	-7.96
Employment								
Employs <10	-0.069***	-3.01	-0.267***	-2.91	n/s		n/s	
Employs 25-50	n/s		-0.207*	-1.99	n/s		n/s	
Employs 50-180	n/s		-0.236**	-2.24	n/s		-0.239	-1.7
Outward FDI and single enterprise								
Single enterprise	0.152***	5.11	-----		-----		-----	
Management experience								
Management exp. working outside Scot.	-----		-----		-----		0.408***	3.33
Management exp. selling outside Scot.	-----		-----		0.575***	8.79	0.476***	4.44
Principal component factors - Absorptive capacity								
Strong culture factor					0.130**	2.21	n/s	
Need to keep business stable	-----		-----		-0.148***	-3.09	-0.217***	-3.11
Strong management factor	-----		-----		-0.116**	-2.07	n/s	
Principal component factors - Absorptive capacity (cont.)								
Strong TPM etc. use for one year	-----		-----		0.151**	2.5	n/s	
Strong national co-operation public domain source	-----		-----		-0.106**	-2	n/s	
Strong international co-operation consultant/public research	-----		-----		0.147**	1.86	n/s	
Strong public domain sources	-----		-----		n/s		0.206***	2.86
Strong int. co-operation between client and supplier	-----		-----		0.215***	3.75	0.255***	3.19

Variables	Model 1		Model 2		Model 3 (a)		Model 3 (b)	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Outward FDI								
Outward FDI	0.267***	9.69	0.523***	8.62	0.510***	6.83	n/s	
SDI Help								
SDI help	-----		-----		0.396***	4.2	0.485*	2.63
Foreign owned								
Foreign owned	0.148**	2.47	-----		n/s		n/s	
Innovation								
Product innovation in past 3 years	-----		-----		0.371***	3.21	0.504**	3.48
Process innovation in past 3 years	-----		-----		-0.270*	-1.77	-0.549***	-4.29
Age of firm								
Existed for more than 25 years	-----		-----		0.165*	1.98	n/s	
Number of observations	2277		294		294		294	
LR χ^2	LR χ^2 (26)= 338.35		LR χ^2(23)= 117.04		LR χ^2 (17)= 212.03		LR χ^2 (20) = 296.97	
Prob > χ^2	0.0000		0.0000		0.0000		0.0000	
Log likelihood	-1392.2286		-145.15626		-97.659617		-55.189634	
Pseudo R^2	0.11		0.29		0.52		0.73	
H_0: omitted variables	0.633 – Reject H_0		0.831 - Reject H_0		0.942 - Reject H_0		0.35- Reject H_0	
Es tat classification – Correctly classified	67.15%		72.45%		83.67%		91.50%	
$\hat{p}$	0. 43		0 .50		0.54		0.52	

n/s = Included in Model but not significant   ----- = not included in Model   ***/**/* denotes significances at 1% level, 5% level and 10% level

5. Case studies

Previously in the preceding chapter, the GCS, which is a survey of a sample of Scottish firm, had been used as a probit model to identify the determinants of exporting for Scottish firms. This was then followed by the creation and use of a new survey, asking new questions based on theory, which was used to create other probit models, to find the determinants of exporting in Scotland. Probit model 3 (b) had a much higher pseudo r^2 and classification than the previous models, and it included information on variables such as absorptive capacity, management experience and factor analysis variables; the significant variables in the model are shown in Table 5.1 below.

Table 5.1: Significant factors in model 3(b) from chapter 4

Absorptive capacity variables	Variables related to experience	Other significant variables
Types of innovation at the firm	Whether the firm had previously exported	Region
Sources of innovation used by the firm	Management experience	Size
Types of innovation co-operation partner	Age of firm	SDI help
'Need to keep business stable' factor		

5.1. Purpose of case studies compared to surveys

To supplement and explore extra areas and questions that it was not feasible to put in a survey, this chapter interviews eighteen firms from the survey. The aim of these interviews is to find out why and how firms internationalize, such as details on the stages of exporting that firms go through. For example, there are several different theories as to how a firm might start to export: either incrementally, by building up knowledge and contacts slowly or they may start exporting from the firm's inception. Choosing firms from the self-made survey used in Chapter 4 to interview, will allow a detailed picture of their characteristics and behaviour, from both the quantitative and qualitative views. Additionally, there was enough time to use repertory grid technique (RGT) in the interviews of eight of these firms. The RGT is a technique used to reveal information that might be hidden even to the interviewee, by asking for information about attitudes to exporting in a less direct way. The RGT is exploratory in the sense that it tests new information; it is independent from the previous theories. RGT

information is analysed using principal component analysis, which reduces the information in the grids to two dimensions, allowing a clear comparison of the differences between export and none-export deals at the firms.

To select the firms for interviewing, propensity score matching is used based on the propensity scores from the probit model. By examining firms with similar propensity scores that do and do not export will be a more meaningful comparison as the firm's characteristics that are known to be significant based on the probit will be known. For example, a firm that is young, with a large amount of employees and a low percentage of graduates may have a much different propensity to export than an older firm with few employees and a high percentage of graduates.

This work seeks to explore:

a) Additional analysis on firms, comparing exporters and non-exporters, based on an understanding of their predicted propensity to export. Many of the crucial characteristics of a firm that would allow them to become exporters have already been investigated in the previous chapter, so allowing a greater understanding of the firm's ability and motivation to export. For example, having a foreign partnership or technological innovations swapping with foreign firms/suppliers, might be the key motivation/enabler that in the firm's opinion turns a firm into an exporter

b) Determine whether using RGT shows a difference between the exporting and non exporting deals at a firm. Comparison using RGT would allow an understanding of some of the large problems that exporting deals face, or the way that they are treated by exporters.

c) Determine whether the work shown here supports the same conclusions as in chapter 4. Chapter 4 comes to various conclusions about the key variables that might affect the firm's decision or ability to export. Questions here may allow different levels of support to those conclusions.

d) Go to a greater level of detail past the levels supportable in a survey, which has time restraints on the number and quality of questions that can be feasibly asked.

The aim of these case studies is to determine if the results of this work support the previous chapter, providing an alternative view of exporting, from the expert's view, in this case the managers and export managers themselves. This fresh perspective potentially adds new information into the mix that has not previously been thought to be asked. These type of questions all asks more specific information on how the exporting began and uses non-exporting firms for comparison. Combining qualitative and quantitative methods, in this chapter and the previous, for example, qualitative methods allow studying firms in a natural setting, learning theories from the practitioner. This could generate extra comprehension of the nature and complexity of the process from exporting firms compared to non-exporting firms meaning that new valuable insights can be gained. For example, there is clearly a case that economics and economic analysis is a question of generalisation, whereby the question is what can be applied as a fact across large groups of firms. However there is potential in that by examining firms in more detail a greater number of questions can be asked, with more detail and also questions that are not just founded in the preconceptions of the researcher but can come from the experts, who in this case are the export manager and managers of the firm. Potential weaknesses of surveys are that they do not ask the right questions and also that survey question answer options could lead to unclear data because certain answer options may be interpreted differently by respondents. The interviews are likely to support some of the opinions and work in chapter 4, such that SDI support is useful or that innovation is useful for firms to be exporters and the interviews will give extra background and insight.

Next, in section 5.1, a full description is given of the selection process of the firms and in section 5.3 the questions asked to the firms; additionally in Section 5.2 and 5.4 the methodological reasoning behind using RGT is given. Section 5.8 gives full on information on the firms, including: their propensity scores; background information and RGT information for the eight firms that had time to take part in it. Section 5.9 analyses this information and Section 5.10 summarizes the findings.

5.2. <u>Interviews</u>

This section explains the reasoning behind the interviews and the selection process of the firms chosen for interview and an explanation of the repertory grid technique.

5.3. <u>Selection of firms for interviews and repertory grid technique</u>

Firms were selected from the firms who have previously responded to the self-made survey in Chapter 4. By doing this there is already basic information gathered about the firm and there is also a much better way of comparing firms, based on the characteristics that according to the probit 3(b) are likely to lead to exporting. This probit assigned a propensity score to each firm based on the propensity to export and the firms selected for interview were based on nearest-matching which minimises the propensity score difference between firms.

5.4. <u>Questions asked to each firm</u>

A large amount of detailed information had been gathered by survey on the firms and some of the significant variables from model 3(b) are presented in Section 5.8, supplemented by other more interview questions, such as, the timeline of the firm and the amount of competition in the firm's market and RGT questions. Figure 5.1 below, from Crick and Jones (2000) shows some of the factors important in the internationalization decision.

Figure 5.4: Stimuli for internationalization
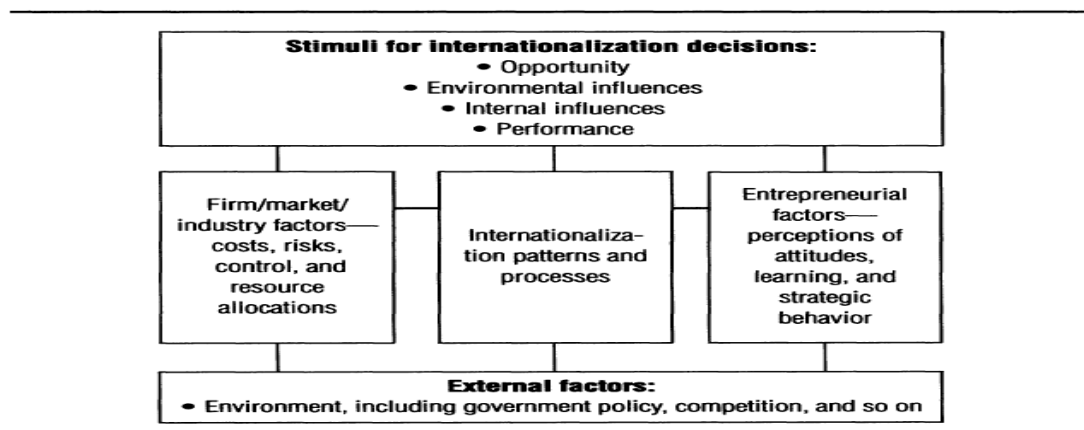
Source: Crick and Jones (2000)

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5.4.1. Timeline of the firm and modes of internationalization

The purpose of this question is to find out when the firm was founded, major changes in the firm, when the firm had been exporting or taking part in outward FDI. The firm could be 'born global'; meaning that it was an exporter from inception or it could have begun to export in a more incremental process, after several years of being formed. This question will also ask what processes the firm had gone through to get to exporting and whether there were any major changes in the firm, such as being taken over, which could explain differences in the internationalization status of the firm.

5.4.2. Where the firm exports to and future markets

The purpose of this question is to find out in which direction the firms exported to, for example, Vahlne and Wiedersheim-Paul (1973) theorize that firms will begin developing links to markets that have closer "psychic" distance to themselves. This means that countries which are further away might still have closer cultural or language or other similarities which make it easier to export. For example, it has been found by other such as Álvarez et al. (2010) who use Chilean data, that the exporting destination is related to the firm's own past experience.

5.4.3. Degree of competition in their market both domestically and abroad

The purpose of this question if to determine the level of competition the firm faces and also whether the firm is a market leader or follower. Knicerbocker (1973) theorized that firms might naturally follow other firms into exporting, depending on the different type of market structure that they were in. For example, in an oligopoly firms might decide to export to constrain the other competitors; determining how much market power a firm has brings a better view idea of how it can compete internationally. Clougherty and Zang (2008) summarize the national-champion rationale, which is that firms who have large domestic operations can take advantage of economies of scale, which allow them to earn large shares and profits in export markets. Lawless and Whelan (2008) finds that while firms do not react and export due to other firms, their behaviour changes based on the domestic market by the number or strength of the competitors.

5.4.4. <u>Any unique resources or advantages the firm had</u>

The purpose of this question is to identify what advantages the firms had to become exporters; firms may have particular competitive advantages. This is explained by Dunning (2009) who refers to the types of advantages internationalising firms may have, including: ownership, location and internalization. Ownership advantages referred to include patents, technical knowledge, management skills and reputation, such as patented technology, brand names, and operating a network. Location advantages could include access to protected markets, favourable tax treatments, lower production and transport costs, lower risk and favourable structure of competition, closer links to natural resources or other factors of production. Internalization advantages come from owning parts of the production process, perhaps through a vertical supply chain that allows the firm to have lower costs over other firms.

5.4.5. <u>How the firm gained new business and motivations for exporting</u>

This question was to find how the firm gained new business, such as did the firm generate the business by being proactive or was the firm more reactive, waiting for new clients and opportunities. For example, firms could be driven to export by a small domestic market, which is more reactive, than pro actively seeking new international opportunities before circumstances force themselves on the firm to make the firm attempt to export. This could be viewed as different levels of initiative taken by the firm's management or entrepreneurs. Below in figure 5.2 is a comprehensive list of the motivations to export from Leonidou et al. (2007). This list shows potentials motivations of a firm to export and whether firms are more reactive or proactive.

Figure 5.5: Motivations to export : Internal and external

Human resource:	Special managerial interest/urge (P)
	Utilisation of special managerial talent/skills/time (P)
	Management trips overseas (P)

Human resource:
    Special managerial interest/urge (P)
    Utilisation of special managerial talent/skills/time (P)
    Management trips overseas (P)

Financial:
    Stagnation/decline in domestic sales/profits (R)
    Potential for extra sales/profits from exporting (P)
    Potential for extra growth from exporting (P)
    Possession of financial competitive advantage (P)

Production:
    Accumulation of unsold inventory/overproduction (R)
    Achievement of economies of scale (P)
    Availability of unutilised production capacity (R)
    Smoothing production of a seasonal product (R)

Research & Development:
    Possession of proprietary technical knowledge (P)
    Possession of a unique/patented product (P)
    Extending life-cycle of domestic products (P)

Marketing:
    Possession of a marketing competitive advantage (P)
    Ability to easily adapt marketing for foreign markets (P)

Domestic market:
    Saturation/shrinkage of domestic market (R)
    Need to reduce dependence on and risk of domestic market (R)
    Possibility of reducing the power of domestic customers (P)
    Unfavourable state of domestic economy (R)
    Favourable foreign exchange rates (R)

Foreign market:
    Possession of exclusive information on foreign markets (P)
    Identification of better opportunities abroad (P)
    Close physical proximity to foreign markets (R)

Home government:
    Government export assistance/incentives (P)
    Ministry of Commerce/trade mission activity (R)
    Encouragement by government agencies (R)

Foreign government:
    Relaxation of foreign rules and regulations in certain foreign markets (R)
    Reduction of tariffs/non-tariffs in certain overseas countries (R)

Intermediaries:
    Encouragement by industry, trade, and other associations (R)
    Encouragement by banks/financial institutions (R)
    Encouragement by brokers/agents/distributors (R)

Competition:
    Intense domestic competition (R)
    Initiation of exports by domestic competitors (R)
    Entry of a foreign competitor in the home market (R)
    Gaining foreign expertise to improve domestic competitiveness (P)

Customers:
    Receipt of unsolicited orders from foreign customers (R)
    Receipt of orders after participation in trade fairs (R)

Miscellaneous:
    Proximity to international ports/airports (R)
    Patriotic duty of local firms (P)

Note: (P) = proactive and (R) = reactive

Source: Leonidou et al. (2007)

5.5. Repertory grid technique

RGT was used to gain further information on the differences between exporters and none-exporters; it identifies what matters to the firms themselves rather than starting with pre-conceived notions of what should matter to the firm. Kelly (1955) created and developed RGT to compare contrasts rather than absolutes. A set of elements (a set of "observations") is compared systematically to discover a person's constructs (certain criteria termed "constructs) and this allows the firms to express their views by means of their own constructs, in their own terms. Jankowicz (2004) describes it as, "a form of structured interviewing, with ratings or without, which arrives at a precise description uncontaminated by the interviewer's own viewpoint."

The advantages of RGT are described in Boyle (2005), "Three major advantages over other quantitative and qualitative techniques. These advantages are the ability to determine the relationship between constructs, ease of use, and the absence of researcher bias. Repertory grids allow for the precise defining of concepts and the relationship between these concepts." Björklund, (2008) explains that other methods of interviews maybe flawed, "Most of the brain structures involved in expert behaviour are separate from declarative memory structures and cannot be introspected; any verbal description is a construction made from other explicit data. If the knowledge of experts is tacit, new interview methods must be found; maybe the Repertory Grid Technique can be used for the elicitation process." This is important as "It is difficult for experts to describe exactly how they do what they do, especially with respect to their use of judgement, experience, and intuition."

Watson et al. (1995) who use constructs to study entrepreneurship, "We wanted our requests for information to enable participants in the study to offer a variety of input, and the *successful* construct directed attention to elements that are critical to entrepreneurial viability. We wanted to see what construct system would develop from this inquiry. Our validity index was not a specific measure of data about profit, number of employees, and the like, but a construct system obtained from individuals who had credible views to offer about entrepreneurship. Our research was primarily qualitative. Our application of the constructivistic approach gave us the flexibility we wanted in order to step back and examine the framework that encompasses the concept of entrepreneurship in a systematic way."

However, on the other hand, Neimeyer & Hagans (2002) show that there are some problems and weaknesses in the elicitation method, sorting technique, rating direction or variations which can affect the affect the outcomes of the method so that different methods will create different sets of constructs which could make the grid outcomes insufficiently reliable. Other potential weaknesses of the method is that it is time consuming; Jankowicz, (2004) suggest that the method can be thought of by some as time consuming, but defends the method arguing that it provides a large level of information relatively quickly and in a structured way.

5.6. Elements and constructs

RGT uses elements, which are the subjects to be rated, and constructs, which are the values that the elements are to be rated on. It was decided that the RGT should be used to compare the types of deal and contracts that the firm made, between the non-exporting and exporting if the firm was an exporter and if the firm was a non-exporter, the differences between a collection of their non exporting deals. From this comparisons and conclusions could be made as to how the firms view exporting deals and contracts. Therefore the elements used were seven contracts made during the previous eighteen months, referring to filed information if necessary. The purpose of the repertory grid technique was to identifying the differences between the most successful and the least successful contracts/deals and the contract/deals that were failures.

To rate the differences between the elements (the contracts of the firms), constructs are used, which are the ways firms themselves perceive the difference between the contracts. An essential characteristic of constructs is that they are 'bipolar' (e.g. cold−hot, good−bad). The technique used here involves allowing the firms to pick both the elements and the constructs themselves in an initial trial which was then used to decide which constructs to ask each following firm. A grid created from the elements and constructs can be analysed by various methods, the method here was non-linear principal component analysis.

It was decided to do two initial trials to determine the 'constructs' to make the grids similar for comparison and also to reduce problems mentioned with RGT, such as a lack of time in interviews and also that open ended questions can be daunting to the interviewee. Also this may counteract some of the weaknesses mentioned by Neimeyer & Hagans, that variation in

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the method reduce comparability. To keep this procedure of asking questions open ended, firms were also allowed to add any extra elements of their own (though most chose not to).

In summary, RGT will provide a linkert scale 1 to 7 which ranks factors comparing export deals and none-export deals. For the firms that did not export the difference between large successes and mediocre will be established. Also for both the exporters and none exporters failures will be ranked .The procedure for these trials is now explained below.

5.7.The basic procedure of repertory grid technique based on Jankowicz (2004)

A set of elements was agreed with the interviewee. These elements were seven contracts made during the previous eighteen months, referring to filed information if necessary.

Table 5.2: Empty example of a repertory grid

Similarity	Deal 1	Deal 2	Deal 3	Deal 4	Deal 5	Deal 6	Deal 7	Contrast

Taking three elements at random (for example numbers 2, 3, and 6), the interviewee was asked: "For the three contracts/deals, which two contracts/deals were similar compared to the remaining contract/deal and what was that difference?" The similarity is put on the on the left side of the grid sheet; and the converse of this (the reason the third element is different) in the same row on the right of the grid sheet giving a pair of words or phrases which express a contrast. At this stage clarification is held to understand what contrast is being expressed; using the interviewee's words as much as possible with discussion to pinpoint the exact meaning.

This example shows the method used to gain information for the grids. This is done by further combinations of three elements (such as deal 7, deal 6, deal 3 etc.) being offered repeatedly, until no new constructs can be made. The constructs that the initial firms thought important were: amount of sales, ease of supply, ability of the firms to pay up quickly, the length of the contract, who approached the firm (was the order solicited or unsolicited), the size of the customer, the closeness of communication the firm had with the client, the variety of products sold and the ease of negotiating contracts.

These constructs were intuitively satisfying as they suggest both the level of effort needed to create a deal and also the potential problems that might occur in taking part in the deal. The meanings for the scale are given below in Table 5.3.

Table 5.3: Meaning of the linkert scale shown in the repertory grids

What a ranking of 1 denotes	What a ranking of 7 denotes
High Sales	Low Sales
Extremely easy to supply/delivery	Hard to supply/ deliver
Customer/firm pays up quickly	Customer/firm slow to pay up
Long term client/firm	Short term client/firm
Approached the firm/customer	Approached by the firm/customer
The customer/firm is larger	The customer/firm is smaller
High closeness of communication (with the customer/firm)	Low closeness of communication with the customer/firm
High level of organization (of the customer/firm)	Low level of organization of the customer/firm
High variety of products sold	Low variety of products sold
Extremely easy/quick to negotiate contracts (with customer/firm)	Hard/long to negotiate contracts with customer/firm

Table 5.4: Example of a repertory grid

What a ranking of 1 denotes	Export	Export	Export	Non-export	Non-export	Non-export	Failure
High Sales	4	5	6	2	1	**7**	3
Extremely easy to supply/delivery	6	6	6	1	1	**1**	2
Customer/firm pays up quickly	7	5	6	1	1	**3**	4

The elements in Table 5.4 are the three export deals, the three none-export deals and the failure. The constructs are 'volume of sales', 'ease of delivery' and 'speed at which the bills are settled'. An example of what the information represents can be taken by the column highlighted in bold in Table 5.4. This deal was a non-export and had the lowest sales, it was amongst the easiest to deliver and the firm that was the counter party to the deal paid the deal at a medium level compared to other deals. This initial testing was done on two firms and then the same questions were then asked to all the other firms to allow for comparison. Unfortunately, not all firms had time to go through RGT, leaving only eight firms who supplied grids.

5.8. <u>Principle component analysis</u>

To analyse the repertory grid, principle component analysis (PCA) was used. Linting et al. (2007), "The objective of linear PCA is to reduce a number of m continuous numeric variables to a smaller number of p uncorrelated underlying variables, called principal components that reproduce as much variance from the variables as possible." Kruskal and Shepard (1974), Young et al. (1978), and Winsberg, and Ramsay (1983) , explain some of the weaknesses that non linear PCA should be used, as the assumptions that variables have at least an interval measurement scale and are linearly related to each other are often violated. This is because ordinal variables such as the values on a rating scale, for example a Likert-type scale are not truly numeric, because intervals between consecutive categories cannot be assumed. For instance, one cannot assume that the distance on a 7-point scale between 'fully agree' (7) and 'strongly agree' (6) is equal to the distance between 'neutral' (4) and 'somewhat agree' (5). In non-linear PCA the optimal quantification task and the linear PCA model estimation are performed simultaneously[9].

Two dimensions are created for each grid for the sake of simplicity and also as the number of dimension needs to be less than or equal to the number of original variables. The two dimensions each contain information based on the component loadings [10] creating a graphical representation of the position of each deal in relation to each other. Therefore on the scale the similarities between exporters and non exporters, if any, should show up. As each grid is different the dimensions will represent different factors in each grid; in one analysis of a grid, dimension one could be expressing sales, in another repertory grid the representation could be ease of delivery; the weighting or loading of the factors to each dimension is determined by the component loadings.

The measure of the level of representation of the component analysis is given by the Cronbach's Alpha. The lowest Cronbach's Alpha was 0.93 suggesting that the factor analysis was in acceptable bounds. The Cronbach Aplha measures for each grid are reported in the appendix, Tables A1-A8 for firms A-H respectively. An example of how this works can be very simple , for example, if dimension one had high loadings for sales only then it would

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[9] CATCPA analysis is the model used in SPSS, program CATPCA (Meulman, Heiser, & SPSS, 2004)
[10] the weight by which each standardized original variable should be multiplied to get the component score

represent sales and on the scales used in these grids a higher sales score means that there is less sales. Alternatively a dimension could have a negative component loading, suggesting that the dimension is loaded towards lower values of the factor loading into the dimension. A dimension may be strongly loaded by more than one factor and each is explained for each grid. This will show clearly on the grid how each contract/deal is to the other cases.

Table 5.5: Example of component loadings

What a numerically larger ranking denotes	Dimension	
	1	2
Low Sales	.982	.157
Hard to supply	-.346	.852
Customer slow to pay up	.265	.946

Table 5.5 shows that dimension one is highly loaded by 'low sales' and dimension two is highly loaded by 'difficulties in supplying' and the customer 'being slow to pay up'.

Figure 5.6: Example of graph representing the repertory grid information
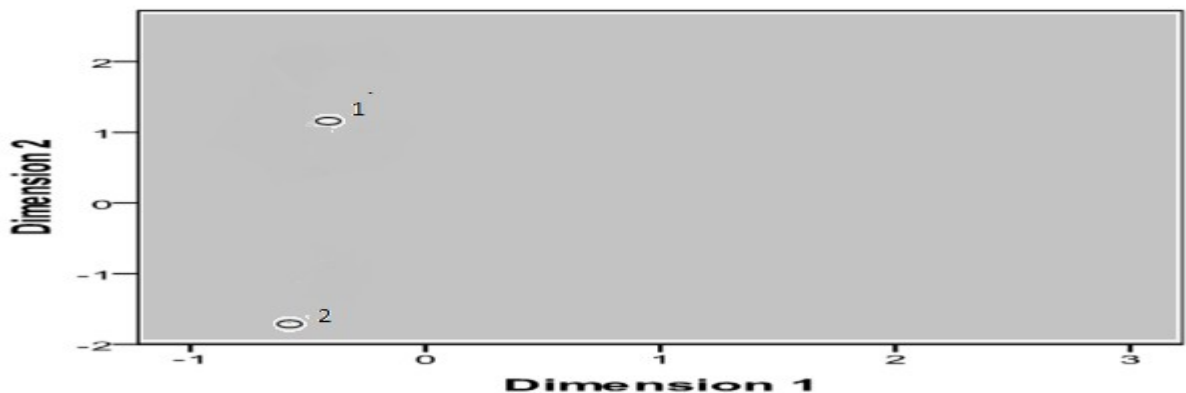
Here the two 'deals' are represented by dot one and dot two; both dots are at the same positions on dimension one, but dot two is negative in dimension two. This means that dimension two represents a deal which is harder to supply and the customers are slower to pay up. The ease in identifying the dissimilarity/ similarity between contracts/deals is one of the main advantages of principal component analysis.

5.9. <u>Visited firms</u>

Firms were visited and given phone interviews in the last quarter of 2011, they were identified from a list of their propensity scores to export. A problem mentioned was the lack of time at firms to interview, resulting in few firms agreeing to be interviewed, especially non-exporters. Table 5.6 below gives the propensity scores of the firms that agreed to be interviewed.

Table 5.6: Propensity scores of visited firms

Firm	Propensity score	Currently Export	Grid Analysis	Interviewee
Firm A	0.56	Yes	Yes	M. Director
Firm B	0.33	Yes	Yes	Partner
Firm C	0.10	No	Yes	Owner
Firm D	0.22	No	Yes	Sales manager
Firm E	1.00	Yes	Yes	Owner
Firm F	0.67	Yes	Yes	Owner
Firm G	0.50	Yes	Yes	Owner
Firm H	0.96	No	Yes	Owner
Firm I	0.99	Yes	No	Director
Firm J	0.47	Yes	No	Export manager
Firm K	0.02	No	No	Owner
Firm L	0.94	Yes	No	Owner
Firm M	0.29	Yes	No	Owner
Firm N	0.09	No	No	Owner
Firm O	0.99	Yes	No	Owner
Firm P	1.00	Yes	No	Export Manager
Firm Q	1.00	Yes	No	Partner
Firm R	1.00	Yes	No	Manager

Source: Model 3(b), Chapter 4

As can be seem in Table 5.6 were a wide variety of propensity scores from the firms that were visited, the highest propensity score for a non-exporter is 0.76 for Firm C and the lowest for an exporter is 0.29 for Firm M. Firm E, P, Q and R had by far the strongest propensity scores of the firms visited. Part of the reason for low propensity scores included the fact that some firms were in a particular industry or region. Only eight firms, firms A-H, had enough time in the interview to discuss the repertory grids.

5.9.1. Characteristics of firms that supplied a repertory grid, the significant factors that should effect whether they export (Firms A-H)

There were eight firms that supplied a repertory grid and their information is shown in Table 5.8. Explanations of the creation of the variables are given in Chapter 4; some of the variables are principal component factors as noted in the table.

Table 5.7: Characteristics of firms that supplied a repertory grid, a selection of the significant factors that effect whether they export based on model 3(b) in chapter 4 (Firms A-H)

Firm	A	B	C	D	E	F	G	H
Years in business	23	35	5	32	7	150	11	16
Management experience working outside Scotland	No	Yes	No	Yes	Yes	No	Yes	Yes
Management experience working for a firm that had exported	No	Yes	No	Yes	Yes	No	Yes	No
Management experience selling outside Scotland	No	Yes	Yes	Yes	Yes	No	No	No
Management experience working for a multinational	No	Yes	No	Yes	Yes	No	Yes	No
Total Employees	24	84	5	30	17	13	4	14
Outward FDI	No	No	No	Yes	Yes	Yes	No	No
SDI help	No	Yes	No	Yes	No	No	No	No
The firm needs to keep business stable	0.6	-0.96	0.07	0.07	-1.57	-1.11	-0.04	-0.04
Strong national co-operation between client and supplier [a]	-0.2	0.05	-0.33	0.05	-.67	0.05	0.05	0.05
Strong public domain sources of innovation [a]	0.51	-0.24	1.12	-0.24	-.10	-0.24	-0.24	-0.24
Strong int. co-operation between client and supplier [a]	-0.64	-0.42	0.01	-0.42	3.6	-0.42	-0.42	-0.42
Product innovation	1	0	0	0	0	0	0	0
Process innovation	1	0	0	0	1	0	0	0

Source: Author's survey
[a] Principal component factor

5.9.2. Characteristics of firms that did not supply a repertory gird (Firms I –R)

The firms that did not have time to supply repertory gird are included as below in Table 5.8. One of the characteristics that stand out is that firm J is the largest firm in number of employees.

Table 5.8: Characteristics of firms that did not supply a repertory gird (Firms I –R)

Firm	I	J	K	L	M	N	O	P	Q	R
Years in business	20	111	28	11	15	21	20	11	18	5
Management experience working outside Scotland	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No
Management experience working for a firm that had exported	No	Yes	No	No	No	Yes	No	Yes	Yes	No
Management experience selling outside Scotland	No	Yes	No	No	No	No	No	Yes	Yes	Yes
Management experience working for a multinational	No	No	No	No	No	Yes	No	Yes	Yes	No
Total Employees	222	1200	3	3	3	1	6	330	5	17
Outward FDI	Yes	No	No	No	No	No	No	Yes	No	Yes
SDI help	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Strong national co-operation between client and suppliers	0.68	0.15	-0.31	-0.31	.047	-0.39	-0.36	0.26	-.45	0.35
Strong public domain sources of innovation [a]	-0.96	1.16	-1.11	-1.11	-.24	0.89	-0.87	1.14	-.49	2.32
Strong int. co-operation between client and suppliers	0.25	-0.83	1.6	1.6	-.32	-0.31	0.95	-1.9	.059	0.48
Product innovation	0	0	0	0	0	0	1	0	0	0
Process innovation	0	0	0	0	0	0	1	0	0	1

Source: Author's survey
[a] Principal component factor

5.9.3. Firm A: Exporter

The firm had a propensity score of 0.56, which was a low score for an exporter, suggesting that it would be interesting to discover how with such a low score the firm had become an exporter. Firm A is a dental design lab, whose work includes specialist crown work and veneers and has existed since 1987. The firm began exporting in 1990, as their clients from Scotland began to move to other countries such as the Republic of Ireland and Firm A was kept as continuing work. The firm is of medium size having twenty four employees, while it has a strong market share in Scotland of approximately 30%, competing with four main competitors domestically. Their size of the Irish market share is approximately 5%, where the firm has two to three main competitors.

Some of the attributes of the firm suggest that the firm may have low levels of absorptive capacity, for example, the firm has no foreign offices, has never received any help from SDI and the senior management of the firm has no experience exporting. Based on the original survey principal component factor scores identified that: the firm believes it has a strong product/service, this should help the firms compete internationally. Additionally, the firm was identified as 'want to try to keep the business stable', which suggests that the firm would not want to expand or try other modes of sale such as exporting. The firm uses 'national public domain sources of innovation', which in the probit in Chapter 4 had a negative effect for potential exporters, compared to international sources of innovation and this, coupled with the fact that the firm ' does not co-operate to a large degree with the client or supplier' would suggest that the firm might be less competitive internationally.

The firm gathers new clients from trade fairs and also from informal networking with other dentists. All export stimuli comes from abroad, from clients they have already known, this explains how with such a low propensity score the firm is still an exporter. The firm's biggest advantage is the reputation of the firm and the way they go about personal care. The firm believes that it's biggest problems in exporting is that that the capacity is not large enough; there are not enough qualified workers to expand and the lack of managerial experience to allow the firm to be an exporter. The firm had time to give information for a repertory grid as below in Table 5.9.

Table 5.9: Firm A: repertory grid and component loadings

What a ranking of 1 denotes	Export	Export	Export	Non-export	Non-export	Non-export	Failure
High Sales	3	6	4	2	1	6	7
Extremely easy to supply/delivery	7	7	7	1	1	1	4
Customer/firm pays up quickly	7	5	6	1	1	3	4
Long term client/firm	2	2	3	1	1	5	7
Approached the firm/customer	7	7	7	6	6	6	1
The customer/firm is larger	6	7	7	4	2	7	7
High closeness of communication	3	3	4	2	2	1	6
High level of organization	6	4	5	3	5	4	6
High variety of products sold	4	4	4	4	1	5	7
Extremely easy/quick to negotiate	1	1	3	7	3	3	5

Component Loadings

What a numerically larger ranking denotes	Dimension	
	1	2
Low Sales	.982	.157
Hard to supply	-.346	.852
Customer slow to pay up	.265	.946
Short term client	1.000	.025
Approached by the customer	-.950	.298
The customer is smaller	.426	.758
Weak communication with the customer	.986	-.066
Low level of organization of the customer	.532	.653
Low variety of products sold	.997	-.058
Hard to negotiate contracts with	.531	-.756

Dimension one represents 'low sales and low closeness of communication and a 'short term client' firm versus 'approached by the customer'. Dimension two represents the customer 'slow to pay up' and being 'hard to supply deliver' versus hard to 'negotiate contracts with'.

Figure 5.7: Firm A: repertory grid analysis
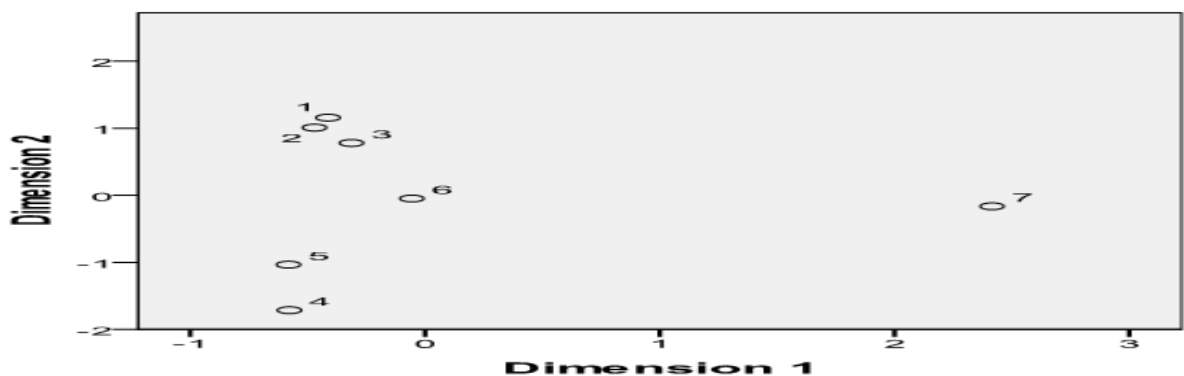
Export deals are numbered one to three and are all clearly clustered together being negative in dimension one and positive in dimension two . None-export deals are numbered 4 to 6. 7 is the failure and it is very positive in dimension 1 and neutral on dimension 2.

The export deals were had 'larger sales', with 'better communication' between the firms and the firm 'approached the client', while the contracts were 'more likely to pay up' and easier to 'conduct negotiations with'. Case 7 shows that the failure was partly 'low sales' and being a 'short term client' and that the 'client approached the firm'.

5.9.4. Firm B: Exporter

The firm had a propensity score of 0.33, which was a low score for an exporter, suggesting that it would be interesting to discover how with such a low score the firm had become an exporter. Firm B was formed in the UK in 1975 and it creates and sells management training skills on negotiation techniques. It has 30 offices across the world, delivering over 1,000 courses per year in 17 languages for many blue chip organizations. The firm uses both FDI and licensing; the licensing involves those that wish to train the management skills packages from the company, while the firm also has offices in Germany and USA. The belief of the company is that that licensing is more cost effective, especially compared to FDI which did not provide any major cost savings. The firm's export awareness began in 1984 leading to the firm starting to export between 1986 and 1988, within this period the firm tried FDI in Germany and France, but this was not a successful venture. Since this initial period they have used licensing deals in countries and regions such as North America, Singapore, Hong Kong and Ireland. The firm's structure is set-up so it always seeks to expand; with the next export market being Brazil. The firm has a strong domestic market share of 30% with one big firm and two to three small firms competing in the domestic market. The firm has 10% of the foreign markets that they serve, with two to three large competitors firms and ten smaller competitors.

The firm is medium sized with 84 employees. Firm B has also received SDI help and before exporting the firm already had management experience in exporting. Based on the original survey principal component factor scores identified that: the firm does not feel the need to keep the business stable, this should mean that the firm is not worried about trying new

opportunities, such as exporting. Additionally component analysis suggest that 'There are small amounts of innovation co-operation in the firm', lack of innovation co-operation suggests that the firm may not have a sufficiently strong product or service to compete internationally, however this does not seem to have effected the firm, suggesting perhaps that the quality of their goods was sufficiently high to begin with.

The firm is proactive in generating business; they use informal contacts and network. The majority of the stimulus for sales comes from abroad. The biggest problem in exporting is that old contracts require upkeep that they cannot manage; this requires the firm to use licensing deals. They have had problems spreading to countries as there was a lack of skilled workers.

Table 5.10: Firm B: repertory grid and component loadings

What a ranking of 1 denotes	Export	Export	Export	Non-export	Non-export	Non-export	Failure
High Sales	1	1	3	3	3	7	1
Extremely easy to supply/delivery	2	2	2	1	2	7	2
Customer/firm pays up quickly	2	2	1	7	2	7	2
Long term client/firm	1	2	1	3	1	3	7
Approached the firm/customer	2	5	7	5	2	2	2
The customer/firm is larger	1	1	5	4	6	1	1
High closeness of communication	4	4	1	1	4	4	7
High level of organization	4	1	1	1	7	4	4
High variety of products sold	1	1	7	7	7	4	3
Extremely easy/quick to negotiate	2	2	1	2	2	4	7

Component loadings

What a numerically larger ranking denotes	Dimension	
	1	2
Low Sales	.540	-.476
Hard to supply	-.549	-.360
Customer slow to pay up	-.700	.267
Short term client	-.311	.762
Approached by the customer	.819	.555
The customer is smaller	.814	-.453
Weak communication with the customer	-.819	-.555
Low level of organization of the customer	-.819	-.555
Low variety of products sold	.824	-.392
Hard to negotiate contracts with	-.865	.218

Figure 5.8: Firm B: repertory grid analysis
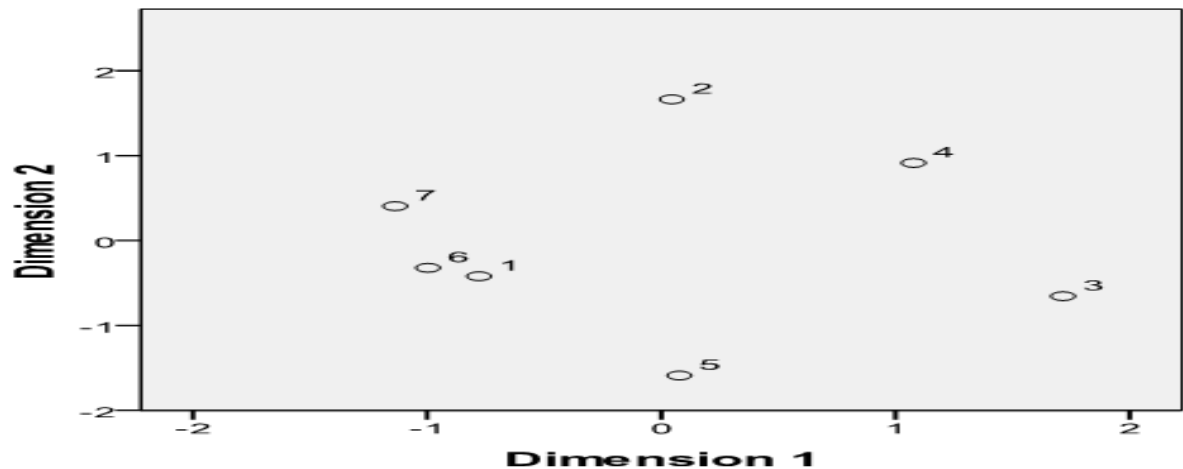
Export deals are numbered 1 to 3 and none-export deals are numbered 4 to 6, with case 7 the failure. As can be seen there are no clear clusters of exporters or none exporters, with a spread across the dimensions meaning that there is no clear pattern. The failure is the most negative in dimension 1 which represents a firm that has 'high levels of communication' and also that the firm was' approached for the business'.

5.9.5. Firm C: Non-exporter

The firm had a propensity score of 0.10. The company is a small local brewery in the Highlands of Scotland formed in 2005 and it supplies hotels, pubs and restaurants. In the firm's local market it has four to five brewers in competition; the firm has approximately 10% of the local domestic beer market.

The firm does have some management experience selling outside Scotland. Factors that suggest that the firm will not be an exporter include that the firm is very small with only five employees and has received no help from SDI. Based on the original survey principal component factor scores identified that: the firm actively tries to stay stable and it is not looking to expand, suggesting that the firm would not try to become an exporter. Innovation comes from public domain sources.

Their biggest strength is the firm's name, as the tourism brands of Scotland that allow them to sell branded beer. However real ale does not travel well, this coupled with the small size of

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the firm and it's weak market power seem to be the main factors that have prevented the firm from expanding and also becoming exporters. Other weaknesses include the lack of communication within the firm between directors and lack of managerial time and experience.

Table 5.11: Firm C: repertory grid and component loadings

What a ranking of 1	Large Success	Large Success	Large Success	Medium Success	Medium Success	Medium Success	Failure
High Sales	1	2	3	4	5	6	7
Extremely easy to supply/delivery	1	2	3	4	5	1	7
Customer/firm pays up quickly	1	1	6	1	1	1	7
Long term client/firm	1	1	1	1	1	5	7
Approached the firm/customer	1	1	1	1	1	5	7
The customer/firm is larger	1	1	6	3	5	5	7
High closeness of communication	1	3	2	6	5	4	7
High level of organization	1	1	1	3	2	1	7
High variety of products	1	2	3	4	5	6	7
Extremely easy/quick to negotiate contracts	-	-	-	-	-	-	-

Component Loadings

What a numerically larger ranking denotes	Dimension	
	1	2
Low Sales	.994	-.023
Hard to supply	.996	-.065
Customer slow to pay up	.996	-.073
Short term client	.998	-.059
Approached by the customer	.998	-.059
The customer is smaller	.997	-.065
Weak communication with the customer	.510	.860
Low level of organization of the customer	.996	-.073
Low variety of products sold	.994	-.023

Dimension one is approached by the firm customer and short term client. Dimension two is low closeness of communication.

Figure 5.9: Firm C: repertory grid analysis
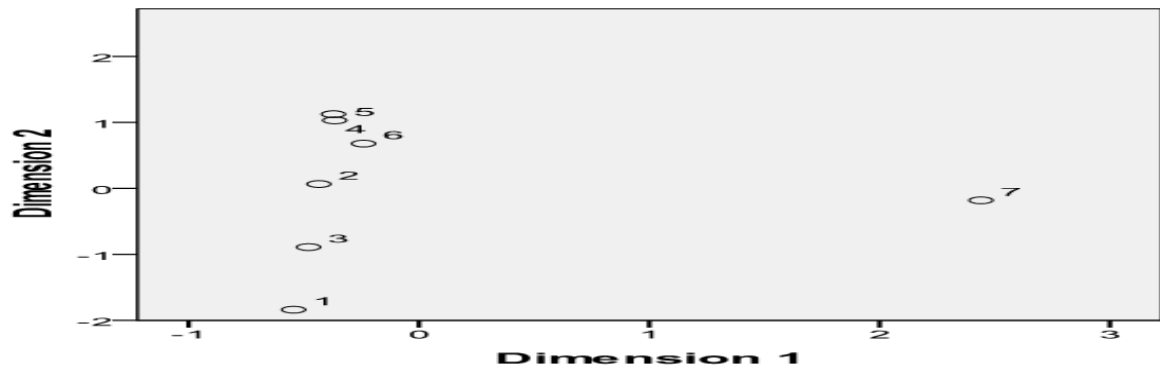
Large success deals are numbered 1 to 3 and medium success deals are numbered 4 to 6, with case 7 the failure. All of the cases here are none – export deals. It is clearly different from the other zones being strongly positive in dimension 1.

The grid shows a clear pattern. The most successful deals are negative in dimension 2, while the outlier is case 7 which is strongly positive in dimension 1. As dimension 2 is most heavily loaded by low closeness of communication, this means that the most successful deals have more communication. The difference in case 7 is that the firm had to be approached and also was a short term client. Approaching new firms and dealing with clients that are not long term are a problem for firm C.

5.9.6. Firm D: Non-exporter

The firm had a propensity score of 0.22, suggesting that it would be unlikely to be an exporter. Firm D has been a producer of chutneys, relishes and pickles since 1968, supplying many major UK sandwich providers and high street retailers. The company has previously exported, in 1974 there was a change in management, with a takeover by an English company and it exported to various countries, including to the USA. The firm was taken over in 1995 and stopped exporting, as it became a subsidiary of a much larger sandwich chain. The firm has approximately 10% of their market, however this may not be relevant as the firm is wholly owned by another large firm.

There were some factors that suggested the firm would not be an exporter, such as neither taking part in outward FDI or receiving SDI help. Based on the original survey principal

component factor scores identified that: the firm tries to keep the business stable, suggesting that the firm will not seek out new markets. Additionally, it does not innovate to a high intensity, suggesting the firm's products will not be competitive internationally.

The firm generates business by doing work for their owner and there is no business taken independently by the firm. As the firm is a subsidiary, the firm's decision making largely comes from the parent company and it is run to suit that company's needs. There is a high degree of competition in the market, both domestically and abroad.

Table 5.12: Firm D: repertory grid and component loadings

What a ranking of 1 denotes	Large Success	Large Success	Large Success	Medium Success	Medium Success	Medium Success	Failure
High Sales	1	2	3	4	5	6	7
Extremely easy to supply/delivery	1	1	1	7	7	1	1
Customer/firm pays up quickly	1	2	3	5	1	4	7
Long term client/firm	1	1	3	4	2	3	7
Approached the firm/customer	1	1	1	7	1	7	1
The customer/firm is larger	1	1	3	4	4	4	7
High closeness of communication	1	1	3	4	4	4	7
High level of organization	2	2	1	7	2	4	7
High variety of products	1	6	3	1	2	4	7
Extremely easy/quick to negotiate contracts	1	5	2	3	3	5	7

Component Loadings

What a numerically larger ranking denotes	Dimension	
	1	2
The customer is smaller	.998	-.019
Hard to supply	-.283	.619
Approached by the customer	-.222	.875
Hard to negotiate contracts with	.999	-.013
Low level of organization of the customer	.609	.774
Weak communication with the customer	.998	-.019
Low Sales	.991	.031
Customer slow to pay up	.999	.010
Short term client	.998	-.017
Low variety of products sold	.989	-.076

Dimension one is difficulty 'negotiating contracts/ weak communication' and 'customer slow to pay up'. Dimension two is being 'approached by firm/customer' and 'low level of organisation'.

Figure 5.10: Firm D: repertory grid analysis
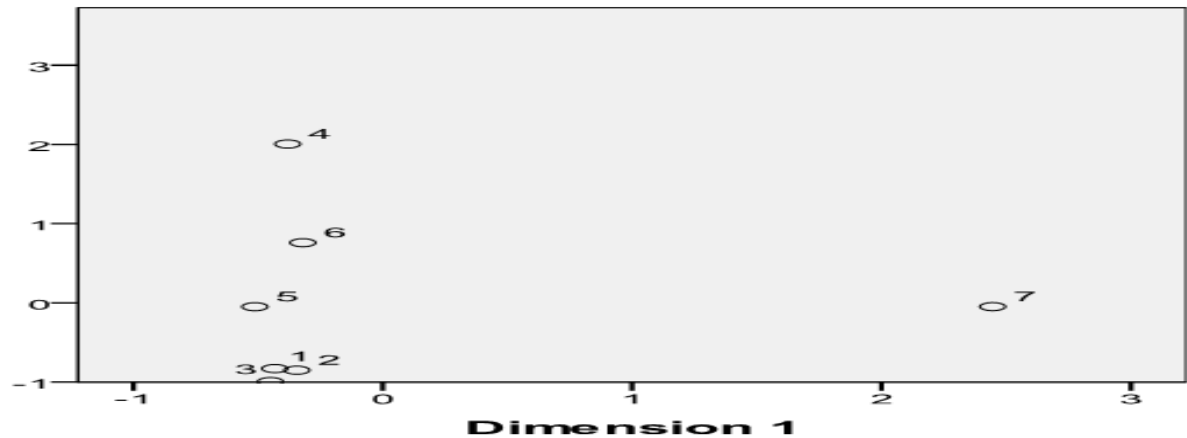
Large success deals are numbered 1 to 3 and medium success deals are numbered 4 to 6, with case 7 the failure. Deals one to three are clearly clustered together, with seven the outlier.

The position of the more successful deals in the dimensions represents that the firms had better communications with them.

5.9.7. Firm E: Exporter

Firm E had a propensity score of 1, suggesting that it would definitely be an exporter and has been exporting since it's inception. It provides world-wide petro physics consulting to the oil & gas industry, since 2003, which involves contract and vendor selection, quality control and examining well data; which the firm described as being unique in the industry. Some of the countries and regions that the firm have exports to include Brazil, the Middle East, The USA and Thailand. The firm has a strong market position within the UK and abroad, due to the nature of the product, which the firm estimated more than 50% of the world market.

Based on the original survey principal component factor scores identified that: the firm had close co-operation with the client on innovation, this suggests that the firm will be able to make a highly tailored product and service that would make the firm more competitive internationally. The firm has a competitive advantage as it is one of the few firms in the world that has the particular skills necessary in it's field. This means that the firm does not need to approach firms to gain business; business is generated by being referred to as it has built up a strong reputation.

Table 5.13: Firm E: repertory grid and component loadings

What a ranking of 1 denotes	Exporter	Exporter	Exporter	None exporter	None exporter	None exporter	Failure
High Sales	1	5	4	2	3	6	7
Extremely easy to supply/delivery	5	6	4	3	1	2	7
Customer/firm pays up quickly	5	6	4	1	1	1	7
Long term client/firm	-	-	-	-	-	-	-
Approached the firm/customer	-	-	-	-	-	-	-
The customer/firm is larger	5	4	6	3	7	2	1
High closeness of communication	5	6	4	3	2	1	7
High level of organization	5	6	4	3	1	2	7
High variety of products sold	-	-	-	-	-	-	-
Extremely easy/quick to negotiate contracts	3	5	4	6	1	2	7

What a numerically larger ranking denotes	Dimension	
	1	2
Low Sales	.906	.415
Low level of organization of the customer	.960	-.281
Customer slow to pay up	.984	-.179
Weak communication with the customer	.898	-.441
Hard to negotiate contracts with	.904	.394
Hard to supply	.960	-.281
The customer is smaller	-.906	-.415

Dimension one is represented by firms slow to pay up versus the firm being smaller. Dimension two is represented by low sales versus weak communication with the firm.

Figure 5.11: Firm E : repertory grid analysis
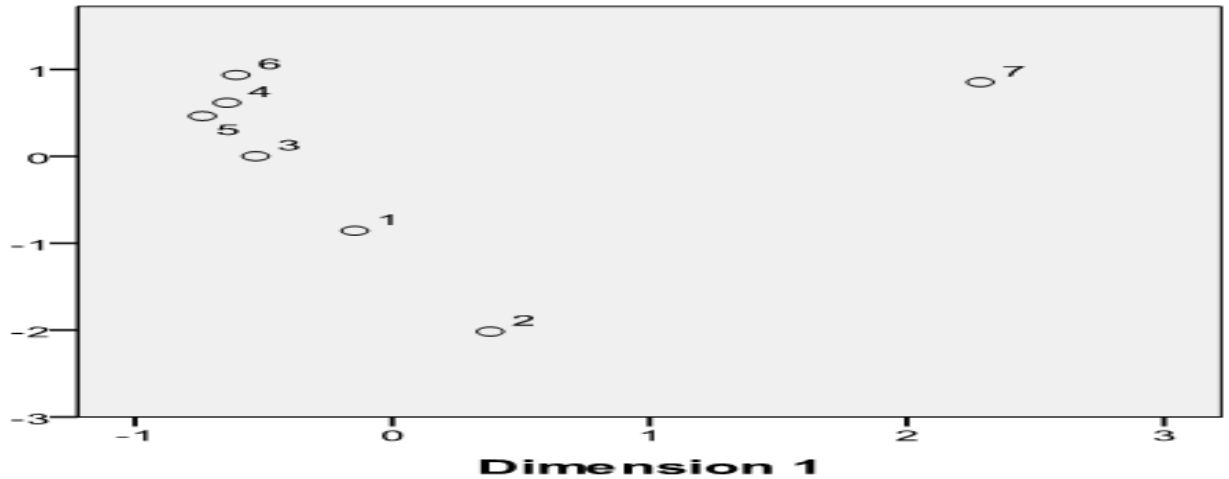
Export deals are numbered one to three and none-export deals are numbered four to six, with case seven the failure. The export deals are negative in dimension 2. As dimension 2 represents low sales low sales and negative weak communication this means that the export deals are characterized by 'worse communication' and 'lower sales'.

Non-export deals are numbered 4 to 6 and are all clearly clustered together; negative in dimension 1 and positive in dimension 2. Case 7, the failure, is positive on both dimension 1 and 2 making it a clear outlier. Non-export deals are characterized by 'higher communication' and 'lower sales' while the failure had problems 'paying up'.

5.9.8. Firm F: Exporter

Firm E had a propensity score of 0.67. The company was established in 1850 on the River Clyde in Glasgow, making technical and non-technical nautical books. The firm has been exporting for the majority of it's existence, recent changes in the firm included: in the 1970's and 1980's the firm received regional assistance loans, development grants, and most recently council grant help in 2008. The firm has strong market power with a market share of 20% around the world and it has three to four main competitors. The firm only has 13 employees, which suggests a low likelihood of being able to export. Based on the original survey principal component factor scores identified that: the firm does not innovate greatly, suggesting that it may struggle to compete internationally.

To gather new business the firm networks with other book companies and they have trading partners. They also go to international book fairs such as on Oslo and Saint Petersburg. The patents they hold on the books is a monopolistic advantage that give it the power to charge high prices and also means that as the books are fairly standard in the nautical world they have to be bought. Another large advantage is that the firm has been in the industry for so long and as being based in an English speaking country is an advantage in terms of the fact that the maritime council that sets laws is based in London. Their product is easily transportable and there is no competition in their market.

Table 5.14: Firm F: repertory grid and component loadings

What a ranking of 1 denotes	Exporter	Exporter	Exporter	None exporter	None exporter	None exporter	Failure
High Sales	1	4	5	1	3	6	7
Extremely easy to supply/delivery	7	3	2	1	1	1	2
Customer/firm pays up quickly	3	3	3	1	1	2	7
Long term client/firm	4	1	1	4	3	6	7
Approached the firm/customer	1	4	5	1	2	6	7
The customer/firm is larger	3	5	4	2	1	6	7
High closeness of communication	3	4	2	1	1	3	2
High level of organization	2	2	2	1	1	2	7
High variety of products sold	-	-	-	-	-	-	-
Extremely easy/quick to negotiate contracts	-	-	-	-	-	-	-

Component Loadings

What a numerically larger ranking denotes	Dimension	
	1	2
Low Sales	.954	-.298
Hard to supply	.386	.860
Customer slow to pay up	.985	.162
Short term client	.946	-.312
Approached by the customer	.963	-.263
The customer is smaller	.979	-.197
Weak communication with the customer	.503	.789
Low level of organization of the customer	.991	.124

Dimension one represents a low level of organization of the customer and the firm is slow to pay up. Dimension two represents hard to supply versus short term client.

Figure 5.12: Firm F: repertory grid analysis
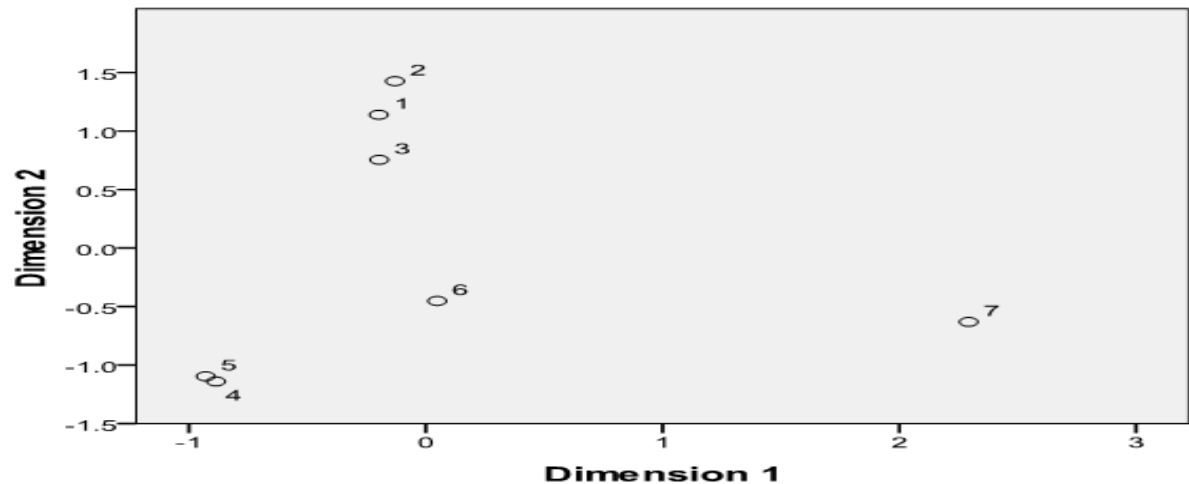
Export deals are numbered one to three and none-export deals are numbered four to six, with case seven the failure. There is a clustering effect with the export deals in similar positions, all positive in dimension two. Case 7 failed due to the firm in question having a 'low level of organization' and 'failing to pay up'. The none-export deals were 'easier to deliver' and more 'organized' but were 'slower to pay up'. The export deals were 'harder to supply' and there was 'weak communication with the client'.

5.9.9. Firm G: Exporter

Firm G had an exporting propensity score of 0.50, which is one of the lowest propensity scores for an exporter, suggesting that there must be an unusual reason that allows the firm to export. It was founded in 1999; working in corporate recovery, legal and contractual services, and management restructuring. It has been exporting from it's existence in part due to the work being niche, with limited demand domestically. The work with international companies includes providing advice and claims management on major construction and engineering disputes, assistance with alliance formation, commercial and technical due diligence. The consultancy also provides training courses for a range of clients, many of them in the Middle East, both as public and specialist in-house courses. In 2009 they opened an associate office in Dubai. They sell in markets such as UK, Norway, Canada, Middle East and South East Asia with future possible markets including Sweden and East Asia.

The manager had highs level of experience in exporting previous to the firm being founded, that would suggest it would be easier to export. Based on the original survey principal component factor scores identified that: the firm does not use sources of information, suggesting that their services would not be able to compete internationally.

Table 5.15: Firm G: repertory grid and component loadings

What a ranking of 1 denotes	Exporter	Exporter	Exporter	None exporter	None exporter	None exporter	Failure
High Sales	4	2	3	1	5	6	7
Extremely easy to supply/delivery	1	1	1	5	1	1	7
Customer/firm pays up quickly	-	-	-	-	-	-	-
Long term client/firm	1	1	7	2	7	1	1
Approached the firm/customer	1	7	2	7	7	7	3
The customer/firm is larger	3	2	1	4	5	7	5
High closeness of communication	3	2	1	6	5	4	7
High level of organization	7	1	3	5	2	6	4
High variety of products sold	2	3	1	7	4	7	7

Component Loadings

What a numerically larger ranking denotes	Dimension	
	1	2
Low Sales	.811	-.104
The customer is smaller	.757	.355
Low level of organization of the customer	-.195	.965
Approached by the customer	.222	-.949
Weak communication with the customer	.952	.210
Short term client	-.588	-.548
Low variety of products sold	.884	-.195
Hard to supply	.813	-.167

Dimension one represents low 'closeness of communication' and low 'variety of goods/services' versus 'short term client'.   Dimension two represents low 'level of organization' versus being 'approached by firm/customer'.

Figure 5.13: Firm G: repertory grid analysis
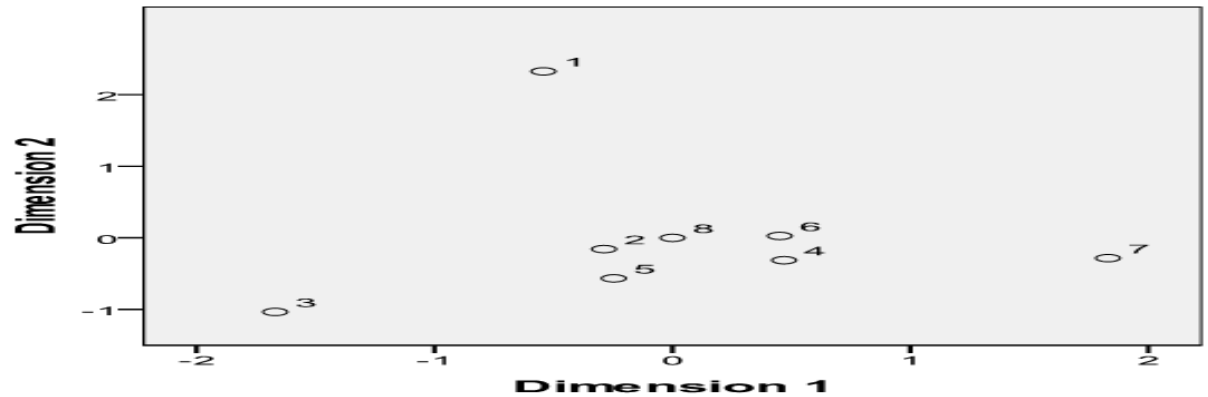
Export deals are numbered 1 to 3 and are all low on dimension 1. None-export deals are numbered 4 to 6 and are tightly clustered together. Case 7 is the failure and is the most positive on dimension 1. The higher the value on dimension 1 the more a firm is not an exporter or is a failure. Export deals are maintained by being 'longer term' and having 'better communications'.

5.9.10.   Firm H: Non-exporter

Firm H, has a propensity score to export of 0.96 suggesting that the firm could be an exporter; the attributes of the firm were more likely to suggest exporting. The firm has been producing for 16 years, specializing in non-destructive testing such as radiographic and ultrasonic used in industries that include: oil refining, petrochemicals, engineering, shipping and power supply. The firm has had experiences of exporting, for example in Iceland and Holland in 2006. These jobs were obtained through word of mouth by working in partnership with other firms. However, this was felt to be overextending for the firm as it is small and so it decided that the cost of exporting was too large and the firm withdrew. The firm has weak market power with approximately 2% domestic market share and has many domestic and international competitors.

Factors that suggest the firm is not likely to export, include that the firm is small with only 14 workers, has no graduates to improve the absorptive capacity of the firm, and had never received help from SDI or used outward FDI. Based on the original survey principal component factor scores identified that: the firm does not use source of innovation to improve

their products and services. This means that they should find it harder to compete internationally.

The firm gets new business by being approached by new clients as was their international contracts in the past. The biggest problem they have found is that they do not have the capacity to export, and that the firm cannot meet demand from abroad as it puts too much of a strain on the firm .

Table 5.16: Firm H: repertory grid and component loadings

What a ranking of 1 denotes	Large Success	Large Success	Large Success	Medium Success	Medium Success	Medium Success	Failure
High Sales	1	1	1	3	3	3	7
Extremely easy to supply/delivery	-	-	-	-	-	-	-
Customer/firm pays up quickly	1	2	3	4	5	6	7
Long term client/firm	-	-	-	-	-	-	-
Approached the firm/customer	-	-	-	-	-	-	-
The customer/firm is larger	1	3	4	6	2	5	7
High closeness of communication	-	-	-	-	-	-	-
High level of organization	-	-	-	-	-	-	-
High variety of products sold	4	3	1	5	1	6	7
Extremely easy/quick to negotiate contracts	-	-	-	-	-	-	-

Component Loadings

	Dimension	
	1	2
Low Sales	.987	-.157
Hard to supply	.985	-.169
Customer slow to pay up	.994	-.033
The customer is smaller	.984	-.124
Low variety of products sold	.810	.586

Dimension one represents low sales and low communications. Dimension two represents firms that are' slow to pay up' and' hard to deliver' versus 'hard to negotiate contracts' with.

Figure 5.14: Firm H: repertory grid analysis
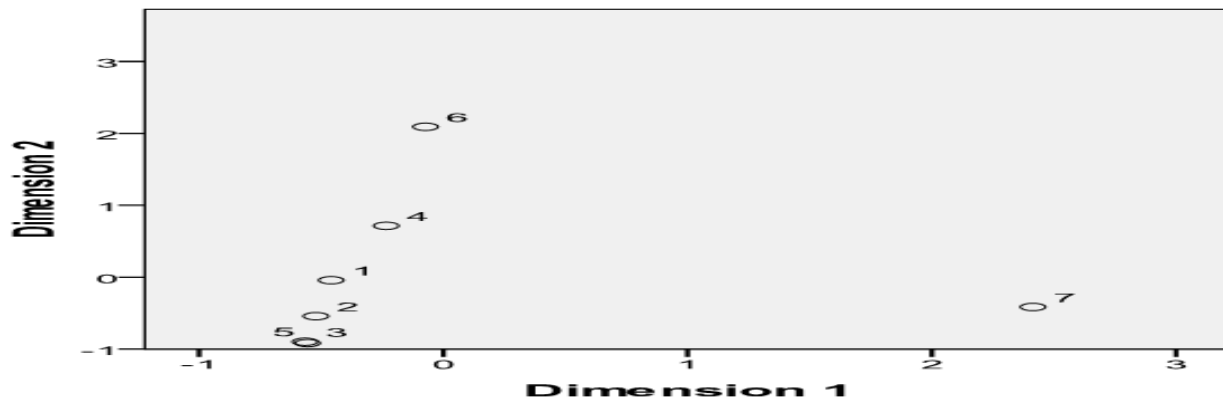
All of the cases here are non–export deals. Case 7 is the failure, clearly different from the other cases being strongly positive in dimension 1. Case 7 is the failure due to' low sale's and 'low levels of communication'. Export deals are more associated with a 'larger variety of products sold'.

5.9.11.   Firm I: Exporter

Firm I had a propensity to score of 0.997, which is a low level compared to other exporters. The firm was established in 1978, providing building services and maintenance expertise within the building industry and offshore oil exploration industry. The firm is part of an umbrella organization that supplies a wide range of construction and support services to firms in the building industry and oil industry. Firm I is the maintenance/support aspect of the umbrella organisation, covering a wide range of hard and soft services, such as maintenance, repair and upgrade of facilities. They currently export to Germany, France, Denmark, Switzerland and Arabia. Firm I has a small role in the UK with approximately 3% of the domestic market. They perceived that there are three to four rivals in the same field. They had approximately 1% of the foreign markets in which they work, with at least twenty competitors in these markets.

Some of the attributes suggest that the firm will be an exporter suggest as it's size of 220 employees and offices in the Middle East. The attributes that suggest that the firm would not be an exporter are that the firm prior to exporting had no managerial exporting experience; and the firm has never received support from SDI.

Based on the original survey principal component factor scores identified that: the firm believes it has strong products and services, which would help with international competitiveness, and is not trying to keep the business stable which means that the firm is more open to change. For their sources of knowledge and innovation they work a great deal nationally with their clients and to a lesser extent also internationally. These sources of knowledge suggest that the firm will make a stronger product that will improve the ability of the firm to export.

Firm I exports by working closely with the construction side of the same business group. It gains new customers based on the customers from the construction side of the firm and is the support department of the umbrella organization. The firm believes it has advantages, for example, Arabian culture is different and requires a different way of doing business. Arabian firms doing a similar job would be slower to respond, the competition in the UK have made the firm better and given them faster response times compared to Arabian firms. Another advantage is that there are certain restrictions in Arabian practices , for example, in an all women hospital only women can work there and as there are many more British women engineers, this is allows the firm to service the hospital. They believe that their biggest problem is finding skilled workers

5.9.12.　　　Firm J: Exporter

Firm J has a low propensity to export, compared to other exporters, of 0.47, it was founded in 1889 and has always been family owned, selling biscuits and other cakes, they describe their growth as "slow and steady". Beginning in 1970 the next generation took over the business and was much more entrepreneurial in finding customers as the firm became aware of the need to export. To help with this there was also a government grant between 1970 and 1976 to help the firm export; by 1976 the firm was exporting in Switzerland and in 1978 the firm was exporting to Japan, with most of their contacts made through trade fairs. By the late 1970s, it had begun exporting to over 60 countries around the world. Current markets that Firm J exports to include: North America, Europe and Japan. The firm is still looking to export to markets such as China, India, Brazil, Russia and Vietnam. Their market share domestically for

the speciality biscuits they make is approximately 40%. There are three other large firms which compete domestically and six smaller firms.

The firm is the largest interviewed with 1,200 people suggesting that there will be capacity in the firm to export. Based on the original survey principal component factor scores identified that: The firm strongly uses public domain sources to innovate, this source implies that the firm is more geared towards their domestic customers.

They generate business by using informal contacts with the majority of the stimulus comes from abroad. The firm has problems with a lack of lack of managerial time and experience meaning which limits market opportunities. This has been overcome by different methods such as help from SDI, including recently in China, here the work included assistance with visits and general contacts.

5.9.13.   Firm K: Non-exporter

Firm K has a propensity to export of 0.02, which is one of the lowest values of propensity to export. The firm was founded in 1982, making glass items and Scottish themed glassware and it is located in a tourist area; the location advantage of the tourist area is key for the firm. The firm has low market power, with 10% of the Scottish themed glass market, of which they have four to five competitors in Scotland. .

The firm is unlikely to export having only 3 workers, no graduates to improve the absorptive capacity of the firm to export, no foreign office, no use of SDI support and there is no previous management experience of exporting in the firm. Based on the original survey principal component factor scores identified that: the firm needs to keep the business stable and therefore will not be seeking extra opportunities. Additionally the firm uses public domain sources of innovation, which is a type of innovation associated with a negative propensity to export in the probit in the previous chapter.

It is a small business and does not export, they have a lack of capacity to supply it's domestic market. Also it is hard to transport glass items: the firm finds insurance a barrier to transporting.

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5.9.14.   Firm L: Exporter

Firm L has a propensity to export of 0.94. The firm makes a variety of different foods, such as speciality mustards, sauces and other comestibles. The firm was formed in 2003 and has been exporting since 2003; trade fairs were a source of informal contacts allowing the firm to begin exporting early after formation. It sells in markets, such as: Singapore, New Zealand, Pakistan, Dubai, Ireland, Switzerland and Spain. The firm has no market power, having less than 1% of the market share everywhere it sells. The small size of the firm, with only three employees could be a problem in exporting. Other factors that suggest that the firm will not be an exporter, is that it has never received SDI help and had no previous management experience exporting.

Based on the original survey principal component factor scores identified that: the firm does not have any need to keep the business stable, this should allow the firm to quickly take up new opportunities. There is strong international co-operation between the client and suppliers abroad suggesting that the firm will be able to make products that are much more suited to the client's need and the firm will have many more contacts abroad.

The firm has managed to thrive as it has used a great deal of innovation in creating new products, which allows the firm to stand out. Also their determination to make use of networking such as at trade fairs and striving to create new and unique products has allowed them to stand out from their competitors, who are much larger and have more experience in exporting.

5.9.15.   Firm M: Exporter

Firm M has a low propensity score for an exporter at 0.29. The firm makes mooring equipment and other aids to help with navigation, primarily based on sonar technology. The firm has been in business for fifteen years and has been an exporter for ten of these years. The firm became an exporter due to being approached by firm as a Scottish University had a programme designed to improve mooring technology in fish farms throughout Europe and the technology that was recommended was from Firm M. The firm seems to be a reluctant

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exporter and did not try to create this opportunity and does not try to promote itself internationally, but nonetheless finds itself an exporter due to the work of the Scottish university in promoting the firm. The firm's market share in the UK is approximately 10 % and the firm has many competitors.

The attributes of the firm suggest it will not be an exporter as it is a small firm with only three employees; it does not use any foreign offices; and it has never received SDI help. Based on the original survey principal component factor scores identified that Firm M does not need to keep stable, meaning that it can take up new opportunities. The firm's largest sources of knowledge and innovation are national co-operation with clients, suggesting that the firm is domestically focused rather than internationally.

The firm does not try to seek new business directly overseas. However, the fact that previously this product was recommended as part of a University's efforts have created a demand for the products.

5.9.16.   Firm N: Non-exporter

Firm N has a propensity to export of 0.09. It was that was formed in 1989, providing services in running computer programmes and training. In 2006 the firm started exporting to Belgium, Sweden and Ireland but has a not been exporting since 2009. The management had lots of experience before exporting. The firm is small and has no market power, with a large number of competitors both domestically and internationally.

Despite being a small company, being only one man, it has many attributes that lead to an expectation of ability to export, such as management experience outside Scotland. Based on the original survey principal component factor scores identified that: The firm has no need to keep the business stable and can change it's business freely. The sources of information are from strong public domain source. The firm generates business based on reputation and informal contacts within their profession. They receive jobs through word of mouth.

5.9.17.   Firm O: Exporter

Firm O had a propensity score of 0.99. The firm was founded in 1983, supplying specialist medical equipment to hospitals within the UK, alongside an increasing export demand. The company began exporting in 2003 to the Middle East, Argentina and the USA and this was in answer to demand from abroad. The firm is a market leader and has a monopolistic position being the only firm that makes it's type of good in the UK. The firm believes that the good produced is too niche for other firms to want to compete against it.

Some of the attributes of the firm suggest that it is unlikely to be an exporter, with only six employees and no previous management experience of exporting. However, the firm has received SDI help in the past which would allow the firm to make contacts more easily. Based on the original survey principal component factor scores identified that: the firm does not feel the need to make the business stable and it has strong products and services , both of which suggest that the firm will be more likely to export with more ability to be flexible and also be able to be more competitive internationally. The sources of innovation come from strong international cooperation between client and supplier, which suggest that the firm will have a more competitive product.

The firm does not need to find new business as it has such as a strong reputation. The firm does not have as much competition as it might as the good produced is relatively niche.

5.9.18.   Firm P: Exporter

Firm P has a high propensity score of 1 to export. It was formed eleven years ago and produces salmon. 2001 was the year the firm first started exporting to countries including France, the USA, Europe, Japan and Switzerland. The firm has a large market share domestically at approximately 10%, although it does have many competitors internationally. The product is associated strongly with Scotland.

There are some attributes of the firm that suggest that it will be an exporter, such as having t330 employees and the firm has received SDI help. The SDI help has been instrumental in helping the firm reach new markets, particularly in recent years. Anther advantage the firm has

is that it has plenty of previous experience at the management level of exporting, before exporting and the firm has offices abroad. The one slight negative attribute towards exporting is the low percentage of graduate workers, which might hinder the absorptive capacity of the firm to change.

Based on the original survey principal component factor scores identified that: the firm had no need to keep the firm stable, which will allow the firm to be more aggressive as it has shown in the number of new markets that it has recently entered. The firm also has strong products and services, this quality of good means that the firm is more likely to be able to compete internationally.

5.9.19.   Firm Q: Exporter

Firm Q has a propensity score of 1, it was founded and started exporting in 1999, producing a range of malt whiskies from Scotland's distilleries to countries such as France, Sweden, Japan and Italy. The product is more niche than others as the flavour is more refined than other more 'simple' whiskies. The firm could only exist in Scotland as it has close contacts with the Scottish Whiskey industry. Additionally, the company had management experience in exporting previously and the firm has received SDI support. However the firm is small with only 5 employees.

Based on the original survey principal component factor scores identified that: the firm has no need to keep itself stable and can seek new markets. It has not got strong innovative products which may decrease the competitiveness of the product. The firm finds new business through distribution partners, trade shows and sales through their website.

5.9.20.   Firm R: Exporter

Based on the original survey principal component factor scores identified that: there is no need at the firm to keep it stable and the firm has strong products and services. This suggests that the firm will be able to be flexible and more competitive. The firm gets business through advertising on the internet; it gets no business through word of mouth. The firm reacts to it's situation and is not proactive.

5.10.   Analysis

The firms provided a rich source of information about their exporting experience or lack of it. Unfortunately, lack of time with some of the firms meant that there was no repertory grid.

5.10.1.   Modes and stages of internationalization (Timeline of the exporting firm)

It is important to consider which types of exporting the firms use and also which elements take place in their timeline. Most firms chose exporting rather than licensing or FDI or a mix of these modes, which is in some ways not expected, as there might be advantages to both FDI and licensing, with for example, lower costs with licensing but also less control. Firm B uses FDI and licensing, preferring licensing. The problem found at this firm is that using FDI and licensing meant that the firm felt that they have lost control. FDI would have theoretically not meant reduced levels of control but the firm found otherwise. The firm believed that licensing could be preferred to exporting as it is a decentralized way of dealing with problems, such as lack of information about markets in each country.

Additionally, several firms have mentioned 'Scottishness' as an advantage in selling their product; and if this product was instead made overseas it would be less 'authentic' which might damage the brand. There are also agglomeration advantages from being located in Scotland, such as in biosciences and the oil industry, which are seen as two of Scotland's strengths. Firms need skilled workers and it may be the cheapest option to find them within Scotland. Overall the balance of control and costs may work together to mean that exporting is the best option, FDI might be an expensive option for firms, while licensing means that there is less control. In the Uppsala Johanson and Wiedersheim-Paul (1978) model, firms take the opportunities outside of their firm based on knowledge and experience of exporting. However some firms may decide to become born global perhaps due to the niche of their good with a domestic market for the good that is small and only by exporting the firm will have a large enough market to sustain it. The possible disadvantages of exporting early in the timeline of the firm are that it might be a drain on the firm's resources, putting extra pressure on the absorptive capacity of a firm to export. There is no clear pattern in what has been the most successful path. Some firms followed the Uppsala traditional (Firm P, Firm J, Firm F). Other

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firms took different paths, there were some firms who were 'born global' (Firm I, Firm E , Firm G , Firm L, Firm B, Firm Q, Firm R). Generally the born global firms had high levels of management experience previous to being founded.

5.10.2.   Areas/ countries that are chosen to export first to by firms Export destination and future exporting

The countries that were exported to had closer 'psychic distance', such as in the EU or the USA or had links created by the product or service. For example, oil industry jobs with Firm I: the firm first exported to the USA where there were company links and then to the Middle East. Other reasons that countries go to areas first are normally that those countries have healthy market for that product. For example, Firm Q is enjoyed in some countries such as Sweden and Japan which might be culturally less similar to Scotland, showing that firms will export to countries that have a well-developed demand for that product, not just on 'psychic' distance.

5.10.3.   Motivations in exporting

There are two different motivations for firms. In these examples there are firms which have drive and determination to export. There are also firms which have become exporters through chance and it is not part of the motivation of the firm.

If a firm is niche such as Firm O or Firm L and Firm G it needs a large number of potential customers which includes the widest possible selection from however far away. On their own terms these firms are too small to compete with bigger firms. However for Firm O there are many life sciences/pharmaceutical firms that could compete but the potential market is small which results in Firm O being the sole firm in the market.

Other firms become exporters because they have been approached from abroad as they have a unique service/product or they may have been unintentionally promoted abroad. For example, Firm M has been promoted by a Scottish university in the past as an organization that had the correct equipment. For this reason Firm M decided to export but otherwise they have would not have enough time or resources to devote to exporting.

5.10.4. Location factors

There are important location factors such as the agglomeration effects of working near to other firms in the same business area; the branding effects of being in a particular area such as the 'Scottish' brand or transport advantage. There are many other firms that benefit from the agglomeration benefits of being in Scotland with Firm O and Firm R both in industries closely related to the biosciences. Scotland has a good reputation internationally for bioscience due to the innovation and university research which gives Scotland a large advantage. This means that these life science firms can benefit from cheaper workers or more readily accessible workers in the area. Without this reputation boost the firms might struggle to sell their goods internationally. Firm E, Firm G, Firm H and Firm I are all from the oil industry, which Scotland specialises in.

Firms such as Firm I and Firm G have good transport links which they actively need as part of their business. However, Firm J has a minor disadvantage from their location in terms of having poor transport links with the rest of Scotland. Firm C is in a relatively remote area and cannot export, in part due to the nature of the product. A large number of firms where located near Glasgow but it made little difference to the way they did business.

5.10.5. Product and service effects

There are two product effects; the product or service is more easily transportable or more niche, having only a small a market with low competition from other firms.

Firm E, Firm G, Firm, Firm H, Firm B, Firm I and Firm R are services and only Firm H does not export. This is because the other firms have advantages such as being in the oil business which has English as it's primarily language and these firms have a determination to move outside of Scotland and get extra business.

Firm A, Firm F, Firm J, Firm P, Firm Q, Firm L, Firm O and Firm M all have products that are very easy to transport and they all export. Firm K's and Firm C's products are more delicate and hard to transport and they do not export. Some of the firms described their products as a

niche, such as Firm L, Firm G, Firm O and Firm F. By selling a niche product two situations are created, as firstly the firm needs from the start to be more outward looking as there is a limited market domestically so there needs to be an expansion from the firm. Another effect is that there is probably less competition in that market as other firms that could compete have not decided to move into that area. A niche product could be a more holistic product as in the example of Firm G which offers a more complete service making the firm much more niche than bigger firms in the same market.

5.11.   Conclusion

This chapter has increased knowledge of the exporting motivations of firms, based on interviews taken. The firms were chosen based on their propensity scores, from the probit 3(b) in Chapter 4. As the probit had a high predictive power a more accurate picture of the ability of a firm to export was shown, meaning that more valid comparisons could be made between non-exporters and exporters.

The interviews have shown:

- A method of determining firms to be interviewed for better comparisons.

- Extra theoretical questions, such as the timeline of the firm and how the firms gained new business.

- Using the RGT technique to build up knowledge of how the firms approach business deals, allowing for a comparison between exporters and non-exporters.

- Using both the information from the survey which was used to create the probit in the last chapter and the interviews to create a more complete picture of the exporting ability and experience of the firm.

These interviews were done to gain more information about the characteristics and behaviour of firms that would lead the firm to internationalize. By combining this extra detailed information to information previously gained by survey, a more complete picture of the firm has been gained. In particular the new information that the case studies bring to bare, include the timeline of the firm.

5.11.1. Comparison of the case studies

The case studies show that some firms export unsystematic ally; they do not deliberately try to export but instead are approached from abroad. There are different reasons for exporting such as tradition (Firm F have been exporting since 1850), unintentional (Firm M, Firm A), deliberate from the start (Firm G, Firm I).

During the interviews all firms where asked about the problems they have in exporting. The problems that really stand out are: managerial lack of experience, the size of the firm and also lack of management direction. If firms do not see the opportunities they cannot take them or if the firms do see the opportunities they cannot use them due to the lack of capacity to increase production or supply services. Small firms may have pressures on managerial time and experience preventing them from exporting; this is argued repeatedly in the literature review in chapter 2 and 3.

Firms can also improve their ability to export by networking, which is a more informal arrangement that allows them to gain information at reduced cost. This improves their knowledge and gets past many barriers to exporting. For example, Firm I and Firm B constantly built up contacts to allow them to export including more variety of ways of exporting such as opening offices abroad or trying licensing deals. Another way to become a successful exporter is by offering a unique or high quality product. Firm O and G have a niche by offering a broad range of services. Firm G is unique because the services it provides are much more holistic Firm F owned the copyright to a good that is legally required for the market it sells to and has few competitors. Firm L sells speciality foodstuffs and as a small firm they need to rely on innovation and quality to compete; larger firms would be able to compete with their business.

The advantages of being based in Scotland, is that it gives access to a highly advanced bioscience industry and oil industry. Firm R and Firm O agreed that these were part of the reasons that they were able to run a successful company as there was a large pool of trained workers to pick from. Additionally, there are some cultural and social advantages that come from being Scottish, with Firm J and Firm L both using the Scottish brand to sell.

Product is also an important factor, as the transportability of the good can reduce the ability of the firm to export, with, for example, Firm K, finding it extremely hard to export fragile glass and Firm C finds beer hard to transport, while other goods such as biscuits from Firm J are more durable and easy to transport, showing how the ease of transport of a product or service the more likely it is that the firm can become an exporter. Market share or power does not seem to effect whether a firm becomes an exporter; theory suggested that domestic market share might be a cause of whether a firm exports as firms with more market power might have more ability to export with advantages. Based on this small sample, domestic market share and the number of competitors seem to have no overall effect on a firm. Firm F had the greatest levels of market share; other firm's market share was much lower. Business direction is more important as, in Firm D for example, there is a similar range of products to Firm L which exports and Firm D is much bigger. However, they do not export as the firm is a subsidiary to a British only firm. SDI was used by the firms interviewed, not as a way to start exporting, but mainly instead as a way to maintain exporting and increase exporting intensity

To reiterate, the purpose of the grids was to gain extra information about firms and how closely related exported deals were to non-export deals with eight firms had time to answer these questions and they did not always show a meaningful pattern for example with Firm B's grid. The grids show differences in how firms understand the deals they are doing with the PCA analysis showing that some of these deals were grouped together. For Firm A the export deals were 'bigger deals', with 'better communication' between the firms and the firm 'approached the client' while the contracts were more likely 'to pay up 'and easier to 'conduct negotiations with'. For Firm E, non-export deals are characterized by 'higher levels of communication' and 'lower sales'. For Firm F, the non export deals were easier 'to deliver' and more 'organized' but were 'slower to pay up'; while it's exports deals were harder 'to supply' and 'longer term'. For Firm G, the export deals are maintained by being 'longer term' and having 'better communications'.

Different firms showed different differences in factors between the failures. For Firm A failure was 'partly low sales' and being a 'short term client' and that the client 'approached the firm'. For Firm C the failure to be approached and also was a short term client. Approaching new firms and dealing with clients that are not long term are a problem for Firm C, while for Firm

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D the failure was approached by the firm. For Firm E the failure had problems in paying up, for Firm F the client had a low level of organization and failed to pay up. Firm H had low sales with the client and low levels of communication.

The next chapter using the "EIM/GDCC" survey, identifies whether the variables found to be significant in exporting for Scotland can also be applied to Europe SME's 2009. It also estimates exporting intensity and experience, this goes further than the Scottish only data used in chapter 4.

5.12.   Policy implications from case studies

This work suggests the different paths that firms may go down to become exporters. This chapter confirms many theories about the motivations and methods that lead firms to become exporters, for example, as many firms are reactive it could be possible to increase exporting participation, by increasing firm's awareness of the availability of exporting. Networking and increasing contacts using ideas such as trade fairs increases the firm's ability to show off their products and services. Policy would be improved if there were more fairs, and more support for such fairs. Also firms should be encouraged to build networks in the directions that they have the natural advantage of cultural advantages in, as hence these links towards other firms should become easier. One of the case studies, firm M, became an exporter due to forward promotion by other associations, in this case it was a university that advised on the suitability of the firm's products. Help does not necessarily need to be linked to only small firms, as niche firms can succeed. However this would need to be balanced out with the fact that these firms maybe hard to identify and additionally that there might be limits to these firms grow, to the possibility that a niche firm may have a more sustainable ability in their exporting as they have less competition for their particular markets. Some of the examples here show that firms that have a niche product will quickly gain strong market power, perhaps with stronger advantages such as knowledge, which is shown as having the copyright to having information or specialist equipment by firms. Better transport links have been suggested by Firm J, who believed that despite being a large successful exporter, the lack of links prohibit some of their activity.

Some of the exporters believed that there were some limits to their growth opportunities, due to lack of technical proficiency in the firm at exporting. More ways could be taken by the policy makers by increasing the openness or direction of people to become exporters. More managers with export training knowledge could allow firms to be more pro active in finding, part of the differences in interviews showed that there could be large differences between the managers of firms being reactive or proactive and these differences could perhaps be ameliorated, by as previously mentioned networking and trade fairs, but also by extra training to help firms respond to opportunities. There are some clear differences between the way that firms run that allow them to become exporters, one of the clearest differences are between firms L and firm D , which exist in a very similar field, but Firm D is far more proactive in innovation and attempts to export despite having worse economies of scale. This is in part due to the fact that firm is constrained by being a subsidiary to another firm.

5.12.1. <u>Employment effects</u>

From this limited sample of case studies, it seems that exporters create greater levels of employment to some degree. For example, it is clear that jobs are created for the firms that produce niche goods and services, without having a large enough market to support themselves the firm may have to close or change it's business considerably. Some of the exporting firms relied on the exporting trade, while others used it as an intermittent source of demand. Some of the firms only export, as the type of job that they do is not needed in this country, due to the specific uniqueness of the job requirements. Additionally many of the firms that export have used the exporting as a source of growth, but some of the firms do not rely on exporting. The largest firm in this sample had grown extra demand into many territories, however it was already a large firm before it did this. This extra level of information provided may help to show overall which types of firms should be preferred for help by policy makers. For example, niche producers of goods my or not be preferred as candidates for support, as there is limited growth potential for the niche goods, but the market will be easier to defend, potentially making it more likely for firms to maintain as exporters. For policy makers there is also a suggestion that increasing the knowledge of worker and management, increasing their ability to export, could be important as there might be a lack of trained workers.

6. Determinants of Exporting in Europe 2009

Further to the work done in chapter 4 and 5 to understand the determinants exporting, a survey done in 2009 on 'Internationalisation of European SMEs' by EIM/GDCC has been utilised, the SMEs all have employment of at most 249 employees in 33 countries by native speakers based on previous surveys (e.g. IfM Bonn published a major study on internationalisation of German SMEs in 2007, studied "The Significance of Internationalisation Activities for German SME").

The aim of analysing this data is to examine on a wider scale if the determinants of exporting are similar to the previous analysis using Scottish data and additionally using this data will allow extra sources of information on what determines exporting; some of the questions are similar to questions asked in the survey of Scottish firms undertaken (see chapter 4). Variables such as region, size, industry, age of firm and others that were variables in section 4.1 were created, plus e-commerce and other variables that were not used in chapter 4.

6.1. European data, EIM/GDCC source

The data was created by a survey done in 2009 on 'Internationalisation of European SMEs" by EIM/GDCC. EIM is the EIM Business & Policy Research, and GDCC is Global Data Collection Company. The data is not a proportional, random sample. The methodology of the data as "A proportional , random sample would result in a large number of responses from micro retail enterprises in large economies such as Italy, but hardly any information on medium-sized manufacturersin Estonia because their number is very limited. In order to obtain conclusions for groups of enterprises at different levels, e.g. manufacturing SMEs or SMEs in smaller economies, these categories of firms are over-sampled to guarantee a sufficient number of observations in such classes."

The full list of countries surveyed include Austria of which there are 233 firms , Belgium (221) , Bulgaria (293), Croatia (220), Cyprus (125), Czech Republic (210), Denmark (197), Estonia (221), Finland (178), France (620), FYROM (201), Germany (622), Greece (243), Hungary(206), Iceland (118), Ireland (181), Italy (623), Latvia (225), Liechtenstein (135), Lithuania (225), Luxembourg (191), Malta (164), Netherlands (303), Norway (174), Poland (628), Portugal (230), Romania (317), Slovakia (200), Slovenia (220), Spain (621), Sweden (223), Turkey (300) and the United Kingdom (612).

There have been some previous studies which have used this data such as "Internationalisation of European SMEs" (2010) by EIM (EIM Business & Policy Research), whose work shows an example probit of the decision to export 2006-2008 and some descriptive analysis of the data.

6.2. Performance of exporters from 2007 to 2008

To support the view that exporters can perform better than non-exporters, the information on employment growth and turnover growth 2007-2008 was examined. Of firms that had existed from at least 2007, exporters 2006-2008 reported higher levels of turnover growth, compared to the non-exporters 2006-2008, over the period 2007-2008. This is a very imprecise way of measuring improved performance between exporters and non-exporters, nevertheless, most interestingly exporters had 48.31% that had an increase of at least 5% compared to 44.56% of non-exporters and of the firms that had a decrease of less than 20%, exporters had a percentage of 6.97% compared to 7.47% of non-exporters. However of the exporters 5 to 20% decreases were larger than non–exporters at 19.96% to 19.05%, exporters showed more variation away from "stability" having a much smaller percentage of firms at 24.77% to 28.92% in the medium category. Overall the data suggests that for turnover, exporters have improved performance.

Table 6.1: Turnover difference between 2007-2008

Perceived difference in turnover 2007-2008	Non-exporters	Exporters	Non-exporters	Exporters
Decreased quite a lot (> 20%)	392	245	7.47%	6.97%
Decreased (5 to 20%)	1,000	702	19.05%	19.96%
More or less stable (between -5% and 5%)	1,518	871	28.92%	24.77%
Increased (5 to 20%)	1,830	1,307	34.86%	37.16%
Increased quite a lot (> 20%)	509	392	9.70%	11.15%
	5,249	3,517		

Of the firms that had existed from at least 2007, employment had increased at a greater percentage for exporters over the same time period. However potentially this may be due to the difference in the characteristics of exporters, rather than the fact that firms are exporters.

Table 6.2 Employee difference between 2007-2008

	Non-exporters	Exporters
2008 employees	200,164	188,716
2007 employees	198,359	185,589
Change from 2007 to 2008	0.90%	1.70%

6.3. Purpose of the work compared to previous chapters

This work seeks to explore:

a) Additional analysis on the determinants of exporting and also levels of exporting intensity. These questions are important to suggest to policy makers which variables could affect exporting ability and also to suggest ways that ameliorate any negative effects to that ability.

b) Determine whether extra variables use in the European survey compared to the Scottish data such as on e-commerce are significant. Due to limitations on the Scottish data, not all types of questions were asked and some were poorly answered.

c) Determine whether the work shown here supports the same conclusions as in the only Scottish data used in chapter 4. As Scotland is a unique economy, it maybe that there are different forces that are creating a temporary effect, such as negative Scotland specific effects from the ongoing 2008 recession, or more positive effects from support such as Regional Selective Assistance or other effects that might mean that there could be other interesting differences with the other European countries.

The aim of this analysis is to determine if the results of this work support the previous chapter, providing another level of information on the determinants of exporting, from the survey of

Scottish firms 2010, the case studies of Scottish firms and this Eim/GDCC data for 2009. There maybe a difference between Scottish firms and the other European firms, for example those other countries could have different cultures and institutions and different levels of development, which may make it easier or harder for firms to export. One interesting difference is that previously Scotland has received support, to develop as an economy such as Regional Selective Assistance (RSA) is the largest and oldest business support scheme currently operating in Scotland. It provides grants to firms undertaking capital investment projects in economically deprived EU designated 'Assisted Areas'. As a component of regional policy, the scheme is principally designed to safeguard and generate employment in the Assisted Areas. Another difference is that Scotland maybe effect by specific events such as the economic recession since 2008, in different ways, which could distort some of the conclusions as a guide to overall determinants of exporting

Using the information in the dataset there are four questions that can be explored:
1. What factors determine whether a firm becomes an exporter (Model 4)
2. What factors determine exporting intensity[11] (Model 4)
3. What factors determine the levels of exporting experience[12] (Model 5)
4. What factors determine whether a firm is an exporter given that they have already exported and hence have already overcome barriers to exporting (Model 6)

Firstly, the economic reasoning for creating these variables 6.5.1 to 6.5.12 followed by the variable's definitions will be presented in section 6.6). Next statistics on the data (section 6.7) divided into; Table 6.5 for comparison between non-exporters and exporters; Table 6.6 for firms with different levels of exporting intensity; Table 6.7 for firms with different levels of exporting experience and Table 6.8 for firms with different level of exporting experience.

The next sections detail the models: section 6.8 details the results of model 4 which is a Heckman model for selection into exporting (results shown in Table 6.8) and exporting intensity (results shown in Table 6.9); section 6.11 is a tobit model (model 5) dealing with exporting experience and section 6.15 is model 6, dealing with exporting age, which includes ordered probits, multinomial logits and selectively constrained models, on the variables for firms of different exporting ages. Conclusions are presented in section 6.25.

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[11] Exporting intensity is measured as percentage of turnover that is exported.
[12] Here exporting experience is defined as time spent exporting divided by age of firm

6.4. <u>Models</u>

Model 4 was estimated with a Heckman two stage equation[13] to work out which variables are significant in determining the different levels of export intensity. This was done for (a) services, (b) manufacturing and (c) all sectors including mining (not in model (a) or (b)). This involves the first stage of the Heckman two stage procedures; a probit to determine what selects into exporting; the marginal effects of the probit are resented in Table 6.9; the second stage measures the effect variables have on exporting intensity the results are shown in Table 6.10. Additionally an omitted variables test[14] to identify whether the equation was correctly specified and a test of independent equations[15] is given to show whether using the Heckman method here over OLS (ordinary least squares) was appropriate.[16]

Model 5 is a Tobit model dealing with exporting experience measured as the total percentage of it's history a firm has been an exporter (i.e. time spent exporting divided by age of firm) for (a) services, (b) manufacturing and (c) all sectors including mining. This shows if the firm is still exporting in 2006-2008 what effect variables have on the exporting experience of firms. This is interesting as it shows which variables are associated with higher levels of experience; this is different from the selection equation in Model 1 which shows which variables are more likely for firm's to become exporters.

Model 6 is estimated using an ordered probit, a multinomial logit and a selectively constrained model dealing with exporting age for: (a) services, (b) manufacturing and (c) all sectors including mining. Four bands are used for four different periods of time that firms started exporting in, given that they are exporting in 2006-2008. The different periods of time show the effect of different variables, given that the firm have been exporting for longer or shorter periods of time and should show the difference between firms that have gone past the initial barriers of exporting. Each band measures the probability of being an exporter given different levels of time spent exporting. Some variables allow firms to get past the initial barriers of

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[13] The stata command Heckman was used.
[14] The stata command linktest was used.
[15] The test of independent equations is part of the stata command Heckman.
[16] The Heckman method is used here to overcome possible sample selection bias of exporters not being a random sample of all firms.

exporting, but the magnitude and direction may change; an example would be product innovation improving the likelihood of firms being exporters and this effect reducing in other bands of exporting age, such as firms that have been exporting for 10 years or more. Potentially another issue that is explained at a greater length in section 6.9 is that firms that have ceased to exist, such as through closure or merger, are missing from this analysis.

Variables used were different from other probits in this thesis as different questions had been asked in the survey. The survey done on the Scottish firms included questions, such as innovation, culture and organisation and other absorptive capacity variables, such as human capital. As mentioned previously and found significant in the previous probits on Scottish data, different forms of innovation as measured gave the firms better capacity for change. These variables were asked in different ways by the EU survey including extra questions on e-commerce (i.e. questions do not overlap perfectly).

Separate models are estimated for manufacturing and services and combined as there are known differences between services and manufacturing, for example, Zeithaml et al. (1985) suggests that services are different from manufacturing as services are not transportable or storable due to production and consumption occurring simultaneously.

6.5. Variables for Models

The variables used in the models are discussed in this section. The majority of the variables could affect exporting propensity, intensity or exporting experience and they were tested in the majority of the models. The full list of variables is given for each model at section 6.2. Statistics on the variables are presented in Section 6.3 (Table 6.5 the differences between exporters/non-exporters; Table 6.6 the differences between different levels of exporting intensity; Table 6.7 the difference between different levels of exporting experience and Table 6.8 the difference between firms of different amounts of time spent exporting).

6.5.1. Age of firm

Firms gave the start date of their firm. There are different beliefs about the stages that a firm needs to go through to be an exporter. In the Uppsala internationalization theory, such as set out in Johanson and Vahlne (1977), an incremental process is used to gain the right level of experience to allow firms to export so that as firms become older they have more experience and better resources that allow it to pass barriers to exporting, age also might pick up effects, such as the firm having a sufficiently developed product or saturated demand in the domestic market. In contrast to the Uppsala internationalization theory where older firms are more likely to export, there is a growing amount of literature on 'born global' firms; these are firms that have been exporting since their inception. McDougall and Oviatt (1996) explain how 'born-global' firms are more likely to be in high technology industries that may require some international sales due to specialised global market niches. They state that, "Technology industries may require some international sales as a condition of industry participation. The emergence of specialized global market niches and the high costs of R&D make early international sales necessary for technology-based firms."

Therefore the hypothesis is that: if a firm has existed for a short time it maybe less stable and have fewer skills to export, however it might be open to change with a clear managerial direction to be born global; means of the data, as reported in section 3, suggests that older firms are more likely to be exporters, additionally older firms are associated with higher levels of exporting intensity but there does not seem to be a pattern on exporting experience.

6.5.2. Distance from land border

Information was provided on the distance from the land border. There are four bands: 50km away from the border, between 50km and 150 km, and above 150 km; and the country having no border, such as Malta, Iceland, Cyprus or the UK. Many papers suggest that distance to export market will affect the likelihood of exporting. Leamer and Levinsohn (1995) state that one of the most important determinants of the magnitude of trade between regions is distance with transport costs higher the higher the distance to a foreign market. Evenett and Venables (2002) show that proximity to an existing market was a consistently significant factor in determining expansion into new markets for sector-level exports from developing countries.

Blum and Goldfarb (2006) find that distance matters even for digitally-traded good. Disdier and Head (2008) use aggregate gravity estimation and find that the distance between two countries has consistently been found to exert a strong negative effect.

Therefore the hypothesis is that: being further from the border decreases the likelihood of having contacts across the border, making the firm less likely to export than closer firms. Firms located closer to the border should (based on this) be more likely to export and have higher exporting intensity, due to increased likelihood of contacts and reduced transport costs. Distance from the border is expected to have a negative effect on exporting propensity and intensity. Mean values of the data suggests that having no land borders is more likely for non-exporters (reported in Table 6.5) and also has lower exporting intensity (shown in Table 6.7). Also lower levels of exporting experience are associated with no land border Table 6.7 and 6.8).

6.5.3. Innovation

Firms gave information on whether they undertook product innovation that was new for their sector, their enterprise or whether they created it in-house. Also they gave information on whether process innovation was undertaken and whether it was new for their sector or enterprise. Love and Roper (2001) find that plants with in-house R&D capability are more likely to export. Innovation is likely to be a key driver of exports, making a firm's products or services better and more suitable for exporting. Constantini and Melitz (2007) find that innovation precedes exports.

Cassiman and Martinez-Ros (2003) explain how innovation related variables are expected to directly raise a firm's export propensity/intensity: The most recent papers on UK innovation and exporting include: Girma et.al. (2008), Harris and Li (2011), and Harris and Moffat (2012). Harris and Moffat uses data from the UK Community Innovation Survey (CIS) covering 2002-2008 for a selection of UK firms, "Spending on R&D in manufacturing had a much larger impact on the probability of exporting which implies that spending on R&D was not simply to boost the probability of producing new goods and services, but also to improve the establishment's knowledge assets which would in turn help it break down barriers to international markets."

Therefore the hypotheses are that: a firm that has developed better processes may be more efficient and be more likely to export. A firm that has developed new products in house may be of high ability with greater absorptive capacity and thus is more likely to export. Taking part in technological co-operation could increase absorptive capacity and ability and motivation to export. The means of the data (located in section 6.5) suggests that some measures of innovation, such as in-house product innovation are associated with higher levels of exporting intensity.

6.5.4. <u>Exports that are subcontracting</u>

Firms gave information on whether they had a subcontracting relationship with other firms or used foreign owned subcontracting relationships. Razzolini and Vannoni (2011) show, using Italian firms observed in the 1998-2003 period, that those using sub-contracting in foreign markets have different channels available to them through subcontracting than just simply replying to production orders from foreign manufacturers. "We argue that the different internationalisation choices and internal organizational structures are related to the trade-off between unitary costs (required to reward the outsourcing firm that purchases the goods in the case of sub-contracting and to ship the goods abroad in the presence of an export activity) and fixed costs (required to organize the selling activity in domestic and foreign markets). The most productive firms should select *active* exporting strategies, while the poorest performers should act as sub-contractors in the domestic market. The other two options, i.e. using the sub-contracting channel to serve foreign markets and being vertically integrated at home, are associated with intermediate TFP values."

Therefore the hypothesis is that: a firm that takes part in foreign subcontracting might be more likely to export as the links have already been made and it might be a complementary strategy. Examining the patterns in the data suggests that subcontracting will increase the propensity to export (from Table 6.5) and higher exporting intensity is related to using foreign subcontracting (Table 6.6).

6.5.5. The role of the internet in internationalisation

Firms explained what level of e-commerce they used from: no e-commerce, to online catalogues to being fully e-commerce compatible as explained in the list of variables. Some literature argues that e-commerce will help with internationalization as e-commerce can help with some of the problems described as the "death of distance" Cairncross (2001). Weill & Vitale (2001) show that the internet is providing firms with new ways to conduct business and to exchange and communicate ideas and information; for example, e-commerce might be important as a method of generating new business. Leonidou et al. (2007) explain that the internet may help exporting as it is an additional platform to receive unsolicited orders. Santarelli and Altri (2003) suggest that e-commerce can overcome some of the cost advantages that larger companies enjoy; therefore it should be useful in increasing the propensity to export for SMEs.

Alternatively Ganotakis and Love (2011) suggest that the use of e-commerce does nothing to boost entry into export markets, but the intensity of its use is associated with increased export intensity. E-commerce was positively associated with export intensity, "calculated at the respective means, a 1 increase in internet sales intensity raises export intensity by around 0.1."

Therefore the hypothesis is that: using the internet will increase the likelihood of a firm exporting and increase exporting intensity. It may also help maintain firms as exporters. The data in section 3 of the means the data suggests that no e-commerce ability is linked to non-exporters, full e-commerce ability to exporters. The data in section 3 also suggests that higher levels of e-commerce ability increase exporting intensity.

6.5.6. Subsidy/ involvement from public sector

Firms gave information on whether they received subsidies to export and information on how to export. Subsidies involve direct financial help which could be important as it is hypothesized in many Models based on Melitz (2003) that one of the largest barriers to exporting are the higher costs associated with this activity. Bernard and Jensen (2001) declare, "By gathering information on foreign markets, states may reduce the cost of entry and thus promote export participation. This would be evident through a reduction in entry costs.

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Alternatively, states may provide a coordination role for potential, or current, exporters and thus decrease the costs of exporting". Girma et al. (2009) document that exports and subsidies are positively related in Germany, "a matching approach applied to uncover any causal effect of subsidies on export activities finds no impact of subsidies on the probability to start exporting."

Therefore the hypothesis is that: receiving a subsidy or information about exporting should increase the likelihood of a firm exporting and increase exporting intensity. The data in Table 6.5 shows that there are significantly more firms that have received subsidies and are exporters and Table 6.6 shows that at higher levels of exporting intensity there is an association with exporting.

6.5.7. Size of firm/ labour productivity

Firms gave values of their number of employees and also turnover. From this is calculated labour productivity. However, labour productivity is not (TFP) total factor productivity and though correlated they are not necessarily the same.[17] Economic theory, such as Melitz (2003), and others based on Melitz, suggests that increased productivity allow firms to export as exporting generates costs. Bernard et al. (2003) explain that exporting faces a higher efficiency hurdle than domestic sales. Wagner's (2007) survey reviews the findings of studies that use micro data at the level of firms. He concludes that, "details aside the big picture that emerges after ten years of micro econometric research in the relationship between exporting and productivity is that exporters are more productive than non-exporters. Wagner (1995) suggest that there maybe benefits to larger firms with, " firms' ability to realise economies of scale in production, benefits from bulk purchasing and an increasing capacity of taking risks through internal diversification'.

 Having higher labour productivity may allow firms to switch to exporting, whereas lower labour productivity suggests that exporting will be too expensive an activity for the firm to take part in. Similar to this is the idea that larger firms will export as they have larger

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[17] Total factor productivity is preferred in many models as the measure of productivity that allows firms to export, for example, Helpman, Melitz and Yeaple (2004), Head and Ries (2003). Unforunately the data does not have sufficient information, such as capital estimates.

economies of scale meaning they wish to have a larger market and also potentially more skills to export. Within the UK most recently Harris and Li (2011) studying the UK firm level data in 2004 found that, " the size of the establishment had a major impact on whether any exporting took place" and "Establishments with higher labour productivity were also more likely to enter export markets."

Therefore the hypothesis is that: firms that have more employees or firms that have higher labour productivity will be more likely to export but larger firms will have a lower exporting intensity. Table 6.5 shows that exporters have more employees and also that turnover per worker is higher.

6.5.8. Regions/domestic market/ being in European Union trade area

As shown in the list of variables the countries were placed into 11 different regions. These include some as the Benelux but also separate large countries by themselves, such as Germany. Another variable is a measure of the size of the domestic market based on GDP 2006, the latter was available from the World Bank and IMF data[18].

Economic theory normally looks at different regions across individual countries. G may decide to agglomerate in a particular area due to good infrastructure. Spillovers associated with agglomeration can raise the probability of export market entry and once entry has occurred there may be additional productivity benefits. Geographical proximity could also minimise the firm's cost of production through joint innovative projects.

Countries with larger domestic GDP may be less likely to export or to have smaller export intensity. A smaller domestic GDP may have the effect of increasing the incentive to export; if the size of the domestic market is too small firms may wish to find sales and profits overseas for growth. Being part of the Euro area may mean better links with other countries and therefore increased likelihood to export. The EU has freedom of movement and trade which should make it easier for firms to export.

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[18] http://data.worldbank.org/

Therefore the hypothesis is that: different regions will have different effects on exporting and exporting intensity; lower levels of domestic GDP for the region the firm is located in increases exporting intensity. Firms that are from countries in the EU will be more likely to export and have greater exporting intensity. Table 6.5 in section 3 shows relationships between specific regions and exporting. Benelux and Nordic countries, France and the UK seem to have a much higher percentage of non exporters to exporters; while Table 6.6 shows Central Europe and the Benelux are amongst the regions that seem to be associated with higher levels of exporting intensity.

6.5.9. Activity abroad

Firms gave details of the offices they had abroad. This included partnerships and details, such as whether there was local production abroad. The partners of a firm may affect a firm's exporting ability, for example, Johanson & Vahlne (2009) explains the importance of networks for SME's. Networks are organized around a web of contacts that can provide formal and informal information and knowledge. By engaging in outward activities, the firm extends its network to foreign markets which is important for new technologies and new trends, local competitors, specific cultural traits and customs.

 Therefore the hypothesis is that: having more infrastructures, such as offices to acquire inputs or a sales office may reduce the costs of exporting, this effect or others will lead firms to be more likely to export or have a higher exporting intensity. Additionally having partners abroad should increase a firm's knowledge of foreign markets. Different levels of infrastructure abroad might suggest different levels of ability and or otherwise change the propensity to export. These relationships seem to exist by examining Table 6.5 with activity abroad, such as partners or sales offices are all associated with the exporters rather than the non exporters. Table 6.6, which shows exporting intensity, seems to be associated with higher levels of having partners outside the country, such as in the EU.

6.5.10.   Industry/services sector

Firms gave information on which industry and services they would select themselves as. Being in a particular industry or service reflect the nature of the product or service impacting on the propensity to export. The industry that the firm is located in might affect a firm and how it exports perhaps through indirect effects with Greenaway et al. (2004) finding that for 1992–96 the presence of multinational firms in the industry sector positively affects the decision to export and the export ratio. Requena and Castillo (2007) find that the probability of exporting to a specific destination by new exporters is positively linked to the presence of nearby exporters from the same industry. Contractor et al. (2007) concludes that the barriers to internationalisation are lower for service firms than for manufacturing enterprises.

Most recently, Harris and Li (2011) found that, "As far as the market or industry is concerned, the results in Table 6.5 indicate that industry/market concentration and agglomeration were both linked to a greater probability of exporting. Sector also mattered; those with the highest propensities to export were (ceteris paribus) chemicals, basic metals and machinery and equipment."

Therefore the hypothesis is that: Ceteris paribus some industries will have negative effects and some will have positive effects on whether a firm is likely to export. These effects may also apply to exporting intensity. Table 6.5 shows 'legal and accounts' as being more associated with non exporters rather than exporters,' and 'transport which consists of a higher percentage of exporters than non exporters.

6.5.11.   Export destination

The firms gave information on the regions, such as North America or large countries, such as China, that the firm was currently exporting to. Verhoogen (2008) has argued that tougher competition and/or higher quality standards in foreign markets might spur exporting firms to innovate, upgrade production technologies; and change the skill composition of their personnel towards highly-educated workers. Exporting firms may get access to technical and management knowledge accumulated in international markets and foreign countries and there

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may be important feedback channels for firms who undertake exporting. These feedbacks and the potential differences between the costs of different export destinations may mean changes to exporting intensity. Studying Belgian firms, Pisu (2008) argues that, "sunk costs of exports may be country-specific and larger in advanced and sophisticated markets. Because of the advanced technologies used in developed countries, exports to such locations may be expected to generate more learning opportunities than shipping goods to less developed destinations. Also, markets in developed countries are generally more competitive than those in developing countries."

Therefore the hypothesis is that: Export destinations will affect exporting intensity due to reasons, such as spillover effects and also different countries may be easier to export to. Table 6.6 shows that higher levels of exporting intensity are associated with some destinations, such as 'other European union countries' and 'Russia'.

6.5.12.   <u>Imports (Origin of imports, region or country)</u>

Firms gave information on the regions that they import from, such as 'European Union', 'North Africa' or large countries, such as 'Japan' and 'India'. Importing might be important for both exporting intensity and exporting as the spillover effect of links with other countries could increase the knowledge of foreign markets making the firm more likely to export. This will also show the amount of integration with a company into the world market, through global supply chains. Additionally using more imports as inputs could increase the productivity and the quality of firm's goods. Gibson and Graciano (2011) argue that the benefit of using imported inputs lead to an increase in price competitiveness.

Therefore the hypothesis is that: if a firm imports it will have links with other countries making it more likely to export. Different import destinations may make a difference as the quality of the inputs maybe different, thereby changing the quality of the final product/service. This should also lead firm to have higher levels of exporting experience and maintain firms that have been exporting early. Table 6.5 shows that, imports from different destinations is in the majority of cases there is a higher association between importing and being an exporter. Additionally there is an association in Table 6.6 with importing from the regions and higher levels of exporting intensity.

6.6. Definition of Variables

Here in table 6.3 are the dependent variables, followed by the independent variables by category used in the models, with the models that each variable were used in.

Table 6.3: Dependent variables

Variable	Definition	Values	Model
Export status	Was an exporter 2006-2008	Dummy	4
Exporting intensity	Percentage of exports of turnover	Continuous	4
Exporting experience	Percentage of time spent exporting/ Total time firm has existed	Continuous	5
Time spent exporting	Four bands of exporting age A. Was an exporter 2006-2008, that started exporting between 2002 and 2008 B. Was an exporter 2006-2008, started exporting between 1996 & 2002 C. Was an exporter 2006-2008, started exporting between 1989 & 1996 D. Was an exporter 2006-2008, started exporting before 1989	Dummy	6

In the next section are the variables and the expected direction of effect exporting will have on the propensity of a firm exporting, exporting intensity, experience and exporting age.

Table 6.4: Explanatory variables

Variable	Definition	Values	Hypotheses			
			Model 4 Exporting[19]	Model 4 Exporting intensity[20]	Model 5	Model 6
Age of firm						
Recently created	If the firm existed for less than ten years	Dummy	-	-	-	n/a
Medium age	If the firm existed for between ten and twenty five years	Dummy	x	x	x	n/a
Oldest age	If the firm existed for more than 25 years	Dummy	+	+	+	n/a
Distance from border						
Close to border	If the firm was 50 km or less away from the border	Dummy	+	+	+	+
Medium distance	If the firm was between 50 and 150 km further away from the	Dummy	x	x	x	x
Far from border	If the firm was 150 km or more further away from the border	Dummy	-	-	-	-
No land border	If the firm was in a country without a land border, Malta UK etc.	Dummy	-	-	-	-
Innovation						
Process innovation	If the firm undertook process innovation	Dummy	+	+	+	+
Product innovation inhouse	If the firm designed new products "in-house"	Dummy	+	+	+	+
Product innovation	If the firm gave a value for undertaking product innovation	Dummy	+	+	+	+
Technological co-operation	Technological co-operation 2006-2008	Dummy	+	+	+	+
Subcontracting						
Subcontractor to a main contractor	Subcontractor to a main contractor 2006-2008	Dummy	+	+	+	+
Foreign subcontractor	Foreign subcontractor 2006-2008	Dummy	+	+	+	+
E-commerce						
No e-commerce	If the firm had no website	Dummy	-	x	-	-
Fully e-commerce	If the firm was fully integrated with e-commerce	Dummy	+	x	+	+
Online catalogue	If the firm gave a value for having an online catalogue	Dummy	+	x	+	+
Orders online	If the firm had the ability to have orders online	Dummy	+	x	+	+
Online only	If the firm only transacted business online	Dummy	+	x	+	+
Other forms	If the firm had other forms of e-commerce	Dummy	+	x	+	+
General	If the firm had general information online	Dummy	+	x	+	+

+= Positive expectation, - = negative expectation,   n/a= not used in the model,   x= expectation unknown

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[19] Model 4 uses a selection equation (determinants of being an exporter) and an outcome equation (determinants of exporting intensity)
[20]

Variable	Definition	Values	Hypotheses			
			Model 4 Exporting	Model 4 Exporting intensity	Model 5	Model6
<u>Public sector support</u> Subsidy/ Information to export	If the firm received public subsidy or information to help exporting	Dummy	+	+	+	+
<u>Employment and labour productivity</u> Log of employment	Natural logarithm of the number of employees	Continuous	+	-	+	+
Natural log of labour productivity	The natural log of turnover divided by productivity	Continuous	+	-	+	+
<u>Regions/Domestic market</u> Firm was in the EU	If the firm was based in a country that was in the EU	Dummy	+	+	+	+
Located in Region 1 to 11	1. Italy 2. Germany 3. Spain 4. France 5. UK 6. Poland 7. Nordic countries 8. Benelux 9.Central Europe 10.Romania & Bulgaria 11. Remaining countries (Turkey, Austria, Macedonia, Latvia, Malta, Portugal, Greece, Croatia, Liechtenstein, Lithuania, Cyprus, Estonia, Slovakia)	Dummy	x	x	x	x
Log of GDP 2006	The logarithm of GDP for each country 2006 was taken (IMF and World Bank data)	Continuous	n/a	-	n/a	n/a
<u>Partners and Activity abroad</u> Enterprise invested abroad	Enterprise invested abroad 2006-2008	Dummy	+	+	+	+
Firm had a partner	If the firm had a partner firm located in 1. Own country 2. EU or EEA Member State 3. Countries outside the EU / EEA	Dummy	+	+	+	+

Variable	Definition	Values	Hypotheses			
			Model 4 Exporting	Model 4 Exporting intensity	Model 5	Model6
Activity abroad Offices abroad owned by the firm	If the firm was 1. representative office only 2. only sales office 3. only office to acquire inputs 4. local production (of products or service)	Dummy	+	+	+	+
Industry Industry 1 to 28	If the firm was in the following industries: 1. Mining and quarrying, 2. Not identified, 3. Electricity, gas, water supply, 4. Construction, 5. Sale, maintenance of vehicles, 6.Wholesale trade, 7. Retail trade, 8. Hotels / catering, 9. Transport & comms, 10.Real estate activities, 11.Renting of machinery, 12. Computer activities, 13.Research and development 14.Legal, accounting and auditing, 15.Other business activities 16.Human health activities, 17.Veterinary activities 18.Other service activities, 21.food products, beverages 22.textiles, clothing, leather, 23.wood products, 24.publishing, printing, 25.coke, chemicals,26.metal industry, 27.machinery, 28.Motor vehicles 29.Furniture, jewellery,	Dummy	x	x	x	x
Export destination Export destinations	If the firm exported to the following regions 2006 - 2008 1. Cross border regions, 2. Other European Union (EU-27) or EEA 3. Russia , 4. Other European countries, 5.Middle East, 6.North Africa, 7.Other Africa, 8. Japan, 9. China, 10. India, 11. other Asia, 12. North America, 13. Brazil, 14. Other South and Central America, 15.Australia/New Zealand	Dummy	n/a	x	n/a	n/a
Imports Imports directly from foreign supplier	Imports directly from foreign supplier 2006-2008	Dummy	+	+	+	+
Imported from regions 1 to 15	If the firm imported from the following regions 2006 - 2008 1. Cross border regions, 2. Other European Union (EU-27) or EEA 3. Russia , 4. Other European countries, 5.Middle East, 6.North Africa, 7.Other Africa, 8. Japan, 9. China, 10. India, 11. other Asia, 12. North America, 13. Brazil, 14. Other South and Central America, 15.Australia/New Zealand	Dummy	+	x	x	x

6.7. <u>Data</u>

The data is presented to show the patterns in the data and potential relationships between variables. For example, the data in table 6.5 below represents the mean of each variable as a proportion of the selection converted into a percentage, for example, 34.5% of non exporters are located near the border. Additionally some variables, such as turnover and number of employees are calculated as means and these figures are explained in the variable column. Before comparisons were made the data was cleaned, e.g. removing observations, such as some firms being unsure if they were exporters for the relevant data group (exporting status, intensity, experience and age) meaning that the information is not valid for the selection. The data was divided into services, manufacturing and all sectors (included mining).

6.7.1. <u>Model 4 - data relevant to the selection equation – Exporting propensity</u>

Table 6.5 shows the patterns in the data for model 4, for example, there is a tendency for older firms to be exporters, with for exporters, 45.9% of manufacturing firms of the 'oldest age' period compared to 12.1% who were 'recently created'; however this difference is not so marked for service firms of which the largest percentage of exporting firms at 49.3% are 'medium age' firms. Generally across the data sets the exporters have a higher percentage of older firms than the younger firms, this is shown by the data for model (c) where 20% of non exporters have been 'recently created' compared to 14% of the exporters.

There is a higher percentage of firms that have 'no land borders' for non-exporters at 14.2%, compared to 9.2% of exporters. Exporters have a substantially higher percentage of firms that are subcontractors or who use foreign subcontractors, with for example, in model (c), of exporters 28.1% use foreign subcontracting compared to 8.5% of the non exporters.

Across the models higher e-commerce use is associated with exporting; for example, in model (c) no e-commerce ability has a higher average for non exporters at 34.9% compared to 19.7% of exporters. Additionally in model (c), 11.8 % of exporters have full e-commerce ability compared to 9.5% of non exporters; other variables where e-commerce is associated more with exporters is 'online catalogue', which are used by 57.2% of exporters compared to 44%

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of non exporters. Another variable that is used more by exporters is the public sector support variable, 'subsidy' and 'information', with 7.8% of exporters having received subsidies compared to 0.8% of non exporters.

Turnover is higher for exporters than non-exporters across model (a) and (c), manufacturing firms have only small differences between exporters and non-exporters, and on average more people employed in exporting firms than non exporters across all groups. Other differences can be seen in column c where some regions and countries, such as the UK, France and Spain make up a higher proportion of the non-exporters than exporters; regions which make up a higher proportion of the exporters in model (c) include 'The Nordic countries', which consist of 10.5% of exporters to 9.1% of the non-exporters, and 'the Benelux' which consist of 9.4% of the exporters to 6.8% of the non-exporters.

Having 'partners located in EU/EEA country' were associated more with exporters, in model (c) 23.9% of exporters had 'partners in an EU country' compared to 6.4% of non-exporters, while 'outside the EU partners' was used by 12.7% of exporters compared to 2.4% of non-exporters. Other differences that stand out from the data include industries which are more associated with non-exporting, such as: 'construction' which are 12.0% of the non exporters and 3.2% of exporters; 'retail trade 'which are 14.3% of non-exporters and 5.8% of exporters. Industries that are more associated with exporting include: 'metal industry' which are 8.3% of exporters and 1.4% of non-exporters; 'machinery' which are 7.2% of exporters and 0.9% of non-exporters. Lastly, 'imports' are used by 75.6% exporters compared to 26.8% of the non-exporters for model (c).

Table 6.5: Model 4 data – Comparison between firms that export and non-exporters

Variables	Services (a)		Manufacturing (b)		All sectors (c)	
	Non-exporter	Exporters	Non-exporters	Exporters	Non-exporter	Exporters
Age of firm						
Recently created	20.7%	16.1%	15.4%	12.1%	20.0%	14.0%
Medium age	46.6%	49.3%	47.4%	42.0%	46.5%	45.6%
Oldest age	32.8%	34.7%	37.2%	45.9%	33.5%	40.4%
Distance from border						
Close to border	34.5%	29.2%	37.8%	32.4%	36.5%	30.7%
Medium distance from border	27.2%	32.1%	25.1%	31.0%	26.9%	31.5%
Far from border	22.6%	27.4%	21.6%	28.2%	22.4%	28.0%
No land border	14.1%	10.8%	14.5%	8.0%	14.2%	9.2%
Innovation						
Process innovation new for sector	6.2%	16.8%	8.3%	16.1%	6.4%	16.3%
Process innovation new for enterprise	14.2%	25.7%	18.0%	31.0%	14.7%	28.1%
Product innovation themselves	19.6%	43.1%	32.4%	55.2%	21.1%	48.5%
Product innovation new for sector	14.3%	35.1%	19.9%	36.1%	15.0%	35.5%
Product innovation new for enterprise	17.4%	25.7%	22.2%	28.7%	17.9%	27.0%
Subcontracting						
Subcontractor to a main	8.7%	28.3%	7.2%	23.8%	8.5%	25.7%
Foreign subcontractor	8.4%	33.3%	5.9%	24.0%	8.1%	28.1%
E-commerce ability						
No e-commerce ability	35.2%	21.6%	32.8%	20.5%	34.9%	21.0%
Fully e-commerce compatible	9.6%	13.6%	9.3%	10.4%	9.5%	11.8%
Online catalogue	43.9%	55.3%	44.3%	58.4%	44.0%	57.2%
Orders online	20.5%	24.6%	22.3%	25.6%	20.6%	25.0%
Online only	0.5%	1.2%	0.3%	0.7%	0.5%	1.0%
Other forms	59.4%	73.4%	61.7%	74.1%	59.7%	73.9%
General information	1.1%	1.1%	0.7%	1.1%	1.1%	1.1%
Public sector support						
Subsidy	0.6%	6.2%	2.2%	9.3%	0.8%	7.8%
Information	0.6%	3.0%	0.7%	3.3%	0.6%	3.0%
Turnover/employment						
Turnover £(000's) per worker	90.85	116.89	90.30	90.58	90.94	109.44
Number of people employed	14.4	21.6	14.6	39.6	14.5	29.5
Regions/Domestic market						
Italy	6.5%	6.1%	4.9%	8.7%	6.4%	7.5%
Germany	7.1%	4.2%	6.9%	6.2%	7.1%	5.2%
Spain	7.0%	5.6%	6.2%	6.6%	6.9%	6.0%
France	7.3%	3.2%	7.8%	4.8%	7.3%	3.9%
Poland	6.7%	5.3%	7.1%	5.3%	6.7%	5.3%
UK	7.1%	4.8%	8.1%	4.3%	7.2%	4.4%
Nordic countries	9.2%	11.7%	8.4%	9.7%	9.1%	10.5%
Benelux	6.7%	10.7%	7.5%	8.8%	6.8%	9.5%
Central Europe	8.7%	10.2%	6.8%	11.2%	8.5%	10.9%
Romania & Bulgaria	7.0%	4.8%	8.0%	5.6%	7.2%	5.1%
Remaining countries	26.7%	33.5%	28.2%	28.9%	26.8%	31.7%
Activity abroad						
Invested abroad	4.3%	18.9%	2.1%	17.2%	4.0%	17.8%

Variables	Services (a)		Manufacturing (b)		All sectors (c)	
	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters
Own country Partner	22.8%	30.1%	22.8%	24.8%	22.9%	27.4%
EU/EEA country partner	6.7%	27.9%	5.2%	21.0%	6.4%	23.9%
Partner outside the EU EEA	2.5%	15.7%	1.9%	10.7%	2.4%	12.7%
Representative office	0.6%	2.2%	0.3%	1.7%	0.6%	1.8%
Sales office	0.8%	5.8%	0.7%	4.7%	0.8%	5.1%
Office to acquire inputs	0.1%	0.8%	0.0%	0.6%	0.1%	0.7%
Local production	1.1%	5.5%	0.9%	6.0%	1.1%	5.7%
Industry						
Mining and quarrying	-----	-----	-----	-----	1.1%	2.8%
Electricity, gas, water supply	2.2%	1.0%	-----	-----	1.9%	0.6%
Construction	13.8%	5.9%	-----	-----	12.0%	3.2%
Sale, maintenance of vehicles	4.3%	7.3%	-----	-----	3.8%	3.8%
Wholesale trade	5.2%	16.7%	-----	-----	4.5%	8.7%
Retail trade	16.4%	10.5%	-----	-----	14.3%	5.8%
Hotels / catering	9.6%	2.9%	-----	-----	8.3%	1.4%
Transport, post & communications	6.2%	11.7%	-----	-----	5.4%	5.5%
Real estate activities	6.2%	1.4%	-----	-----	5.4%	0.7%
Renting of machinery	2.3%	2.7%	-----	-----	2.0%	1.4%
Computer activities	3.5%	7.2%	-----	-----	3.1%	3.6%
Research and development	1.2%	4.4%	-----	-----	1.1%	2.2%
Legal, accounting, book-keeping	9.6%	5.8%	-----	-----	8.3%	2.9%
Other business activities	8.2%	10.4%	-----	-----	7.1%	5.4%
Human health activities	5.7%	3.2%	-----	-----	4.9%	1.6%
Veterinary activities	1.0%	2.4%	-----	-----	0.9%	1.1%
Other service activities	4.8%	6.4%	-----	-----	4.2%	3.3%
Food products, beverages	-----	-----	14.5%	10.5%	1.7%	4.6%
Textiles, clothing, leather	-----	-----	12.3%	11.2%	1.4%	5.3%
Wood and paper products	-----	-----	11.5%	8.7%	1.4%	3.9%
Publishing, printing	-----	-----	14.6%	6.2%	1.7%	2.6%
Coke & petroleum products	-----	-----	7.7%	12.2%	0.9%	5.6%
Metal industry	-----	-----	12.3%	17.4%	1.4%	8.3%
Machinery, equipment instruments	-----	-----	8.0%	15.4%	0.9%	7.2%
Motor vehicles/ other transport	-----	-----	9.0%	8.1%	1.1%	3.9%
Miscellaneous manufacturing	-----	-----	10.2%	10.4%	1.2%	4.8%
Export destinations						
Other European Union (EU-27) or	-----	80.7%	-----	87.9%	-----	84.3%
Cross border regions	-----	54.6%	-----	60.0%	-----	57.3%
Middle East	-----	21.3%	-----	23.6%	-----	22.4%
North Africa	-----	15.7%	-----	16.7%	-----	16.4%
Other Africa	-----	17.0%	-----	15.8%	-----	15.8%
Japan	-----	12.1%	-----	13.4%	-----	12.7%
China	-----	14.3%	-----	15.8%	-----	15.2%
Russia	-----	23.4%	-----	25.3%	-----	24.4%
Other European countries	-----	41.4%	-----	39.3%	-----	40.3%
Other Asia	-----	17.0%	-----	14.7%	-----	15.6%
North America	-----	26.1%	-----	24.1%	-----	24.9%
Brazil	-----	11.5%	-----	11.3%	-----	11.1%

Variables	Services (a)		Manufacturing (b)		All sectors (c)	
	Non exporters	Exporters	Non exporters	Exporters	Non exporters	Exporters
Other South and Central America	-----	14.3%	-----	14.3%	-----	14.0%
Australia/New Zealand	-----	13.1%	-----	14.2%	-----	13.4%
Imports						
Imports directly from foreign supplier 2006-2008	25.2%	70.1%	38.0%	80.4%	26.8%	75.6%
Other European Union (EU-27) or EEA	8.7%	33.8%	14.0%	40.3%	9.4%	37.3%
Russia	21.2%	61.4%	30.9%	71.3%	22.4%	66.7%
Other European countries	0.7%	5.6%	1.2%	6.1%	0.8%	6.0%
Middle East	3.2%	18.7%	4.1%	18.9%	3.3%	18.9%
North Africa	1.5%	7.3%	1.8%	8.6%	1.5%	7.9%
Other Africa	0.4%	2.9%	0.4%	3.2%	0.4%	3.3%
Japan	0.4%	3.0%	1.0%	2.5%	0.5%	3.1%
China	1.2%	8.6%	1.0%	6.0%	1.2%	7.3%
India	4.9%	22.2%	6.1%	21.7%	5.0%	22.2%
Other Asia	1.4%	9.1%	1.8%	9.1%	1.5%	9.4%
North America	2.1%	12.3%	2.8%	10.9%	2.1%	11.5%
Brazil	3.9%	19.6%	5.0%	13.9%	4.0%	16.8%
Other South and Central America	0.8%	4.0%	0.9%	2.4%	0.8%	3.4%
Australia/New Zealand	0.7%	4.0%	1.6%	2.9%	0.8%	3.5%
Number of observations	4,604	1,628	627	1,144	5,336	2,866

6.7.2. Model 4 - data relevant to the outcome equation - Exporting intensity

Exporting intensity is the percentage of turnover that a firm spent exporting and put into bands[21] for the purposes of showing the structure of the data. The data in table 6.6 below, shows the key differences between levels of exporting in the models, for example, for manufacturing firms age seems to be linked to higher levels of exporting intensity as only 37.2% of the lowest intensity exporters are of the oldest age, this increases to 43% for the highest exporting intensity band. Another difference, is that 'no land border' is associated with lower levels of exporting intensity, as for model (c), the lowest intensity band has 14.2% of firms that are from regions with no land border compared to 8.5% of the highest intensity bands; this difference is similar for manufacturing where 14.5% of the lowest intensity band have 'no land border' and this percentage decreases to 6.5% for the highest intensity band. Another obvious difference shown in the data, is that innovation is associated with higher levels of exporting intensity, for example, for Model (c), 'new for the enterprise innovation' is used by 6.4% of firms from the lowest exporting intensity compared to 15.7% of the highest

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[21] The bands 1, 2, 3 and 4 represent different levels of exporting intensity of 0%, 0%-33%, 33%-66% and 66%-100% respectively.

intensity; in-house product innovation is used by 17.9% of firms at the lowest levels of exporting intensity compared to 26.1% of firms at the highest intensity.

There is a clear relationship between being a subcontractor, which consists of 8.5% of the lowest intensity exporters to 30.3% at the highest intensity for Model (c). Additionally, having a foreign subcontractor consists of 8.1% of the lowest intensity and 34.5% of the highest intensity for Model (c). E-commerce ability shows a relationship with higher levels of exporting intensity, for example, of the lowest band of exporting intensity in model (c), 35.5% of the firms have 'no-e-commerce ability', while of the highest level of exporting intensity, 23.3% have 'no-ecommerce ability'; e-commerce ability is also shown in 'online catalogue' use in model (c) which is used by 44.0% at the lowest exporting intensity band to 55.1% of the highest exporting intensity.

As expected, the data in model (c) shows that public sector support in the form of subsidy, is used by only 0.8% of firms at the lowest exporting intensity compared to 8.1% of firms for the highest exporting intensity band. Regions associated with a higher level of exporting intensity include: Nordic countries (9.1% to 10.4% lowest to the highest band of exporting intensity for Model (c); Benelux (6.8% to 10.0% and Central Europe (8.5% to 14.0% having higher levels of exporting experience. France (7.3% to 2.1%) Spain (6.9 % to 2.1% the UK (7.2% to 3.2%) and Germany (7.1 to 3.8%) have more firms at the lowest level of exporting intensity compared to the highest. Having partners outside the domestic country is associated with greater levels of exporting intensity, 6.4% at the lowest levels of intensity and 29.9% at the highest levels have a 'EU partner', while 2.4% at the lowest to 18.0% at the highest have a 'partner outside the EU'.

Table 6.6: Model 4 data – Comparison between different levels of exporting intensity

Variables	Services(a)				Manufacturing(b)				All services(c)			
	1	2	3	4	1	2	3	4	1	2	3	4
Age of firm												
Recently created	20.7%	14.5%	18.0%	15.7%	15.4%	10.8%	11.4%	14.0%	20.0%	13.1%	14.3%	14.8%
Medium age	46.6%	49.9%	45.2%	52.8%	47.4%	44.4%	38.6%	43.0%	46.5%	47.8%	41.9%	47.2%
Oldest age	32.8%	35.7%	36.8%	31.4%	37.2%	44.8%	50.0%	43.0%	33.5%	39.1%	43.9%	38.1%
Distance from border												
Close to border	34.5%	28.9%	31.1%	27.5%	37.8%	32.8%	38.6%	25.8%	35.0%	30.3%	35.0%	27.3%
Medium distance from border	27.2%	32.5%	31.1%	32.8%	25.1%	31.5%	31.5%	30.1%	26.9%	32.2%	31.0%	31.3%
Far from border	22.6%	26.6%	28.1%	27.5%	21.6%	23.0%	24.4%	37.3%	22.4%	25.3%	26.4%	32.4%
No land border	14.1%	11.4%	9.7%	11.4%	14.5%	12.3%	5.1%	6.5%	14.2%	11.6%	7.4%	8.5%
Innovation												
Process innovation new for enterprise	6.2%	15.5%	16.7%	18.3%	8.3%	15.1%	18.5%	14.7%	6.4%	15.3%	17.9%	15.7%
Process innovation new for sector	14.2%	22.9%	28.5%	25.8%	18.0%	26.9%	31.9%	34.1%	14.7%	24.3%	30.2%	29.7%
Product innovation new for sector	17.4%	24.2%	27.6%	25.3%	22.2%	28.4%	30.3%	27.2%	17.9%	25.6%	29.2%	26.1%
Product innovation new for enterprise	18.6%	19.6%	37.8%	46.9%	44.5%	32.4%	50.8%	60.6%	54.1%	21.1%	42.2%	54.3%
Product innovation themselves	11.3%	14.3%	34.5%	39.0%	31.9%	19.9%	35.0%	38.2%	35.1%	15.0%	34.4%	38.8%
Technological co-operation	10.2%	24.9%	39.5%	37.6%	9.9%	23.7%	30.7%	36.2%	10.2%	24.4%	34.4%	36.6%
Subcontracting												
Subcontractor to a main contractor	8.7%	20.0%	30.3%	34.5%	7.2%	16.7%	26.8%	28.0%	8.5%	18.7%	28.2%	30.3%
Foreign subcontractor	8.4%	21.7%	37.7%	40.6%	5.9%	19.6%	22.1%	30.5%	8.1%	20.8%	29.0%	34.5%
E-commerce ability												
No e-commerce ability	35.2%	21.4%	20.6%	19.3%	33.2%	20.4%	21.6%	19.3%	34.9%	21.8%	19.6%	23.3%
Fully e-commerce compatible	9.6%	14.0%	12.7%	14.0%	9.3%	11.6%	9.8%	9.7%	9.5%	13.1%	11.1%	11.4%
Online catalogue	43.9%	58.2%	56.1%	51.5%	44.3%	57.8%	61.8%	55.6%	44.0%	57.8%	59.2%	54.7%
Orders online	20.5%	26.5%	24.1%	23.1%	22.3%	30.2%	24.4%	22.2%	20.6%	27.5%	24.8%	22.7%
Online only	0.5%	1.4%	0.9%	1.3%	0.3%	0.6%	0.0%	1.4%	0.5%	1.2%	0.4%	1.3%
Other forms	59.4%	75.5%	75.0%	69.9%	61.7%	73.1%	76.0%	73.1%	59.7%	74.3%	75.5%	72.0%
General information	1.1%	0.6%	0.9%	1.8%	0.7%	0.7%	2.0%	0.7%	1.1%	0.7%	1.4%	1.1%
Labour productivity and employment												
Turnover £(000's) per worker	90.85	125.87	118.90	106.72	90.31	102.85	95.70	75.58	91.13	116.77	107.26	87.64
Number of people employed	14.4	20.9	21.3	22.7	14.6	27.9	43.6	51.0	14.5	23.2	31.2	35.4
Public sector support												
Subsidy	0.6%	4.0%	8.8%	5.7%	2.2%	6.0%	11.8%	10.0%	0.8%	4.7%	10.5%	8.1%
Information	0.6%	2.5%	4.4%	2.2%	0.7%	4.1%	3.5%	2.2%	0.6%	3.0%	3.8%	2.1%

Variables	Services(a)				Manufacturing(b)				All services(c)			
	1	2	3	4	1	2	3	4	1	2	3	4
Regions/Domestic market (cont.)												
Spain	7.0%	5.9%	6.1%	4.8%	6.2%	8.9%	7.5%	3.2%	6.9%	7.1%	7.0%	3.8%
France	7.3%	5.2%	2.6%	1.8%	7.8%	5.9%	5.9%	2.5%	7.3%	5.5%	4.2%	2.1%
UK	7.1%	5.6%	4.0%	4.8%	8.1%	7.3%	3.5%	2.2%	7.2%	6.2%	3.8%	3.2%
Poland	6.7%	6.3%	4.0%	5.7%	7.1%	7.2%	4.7%	3.9%	6.7%	6.7%	4.6%	4.6%
Nordic countries	9.2%	10.7%	13.2%	11.4%	8.4%	10.1%	8.7%	10.4%	9.1%	10.4%	10.7%	10.4%
Benelux	6.7%	9.3%	11.8%	10.9%	7.5%	7.6%	8.7%	10.0%	6.8%	8.7%	9.9%	10.0%
Central Europe	8.7%	9.5%	9.2%	11.8%	6.8%	9.1%	8.7%	15.8%	8.5%	9.3%	9.3%	14.0%
Romania & Bulgaria	7.0%	5.2%	4.4%	4.8%	8.0%	5.3%	5.1%	6.5%	7.2%	5.2%	4.6%	5.5%
Remaining countries	26.7%	31.0%	32.5%	37.1%	28.2%	26.8%	25.6%	34.4%	26.8%	29.5%	28.8%	36.7%
Italy	6.5%	6.3%	7.0%	4.8%	4.9%	6.2%	13.8%	6.1%	6.4%	6.3%	10.5%	5.9%
Germany	7.1%	5.0%	5.3%	2.2%	6.9%	5.7%	7.9%	5.0%	7.1%	5.3%	6.6%	3.8%
Activity abroad												
Enterprise invested abroad	4.3%	12.1%	21.1%	23.6%	2.1%	12.6%	19.7%	19.4%	4.0%	12.3%	20.3%	20.6%
Own country Partner	22.8%	29.9%	32.5%	28.0%	22.8%	26.4%	21.3%	26.9%	22.9%	28.5%	26.6%	27.1%
EU/EEA country partner	6.7%	17.2%	32.0%	34.5%	5.2%	15.2%	20.1%	27.6%	6.4%	16.5%	25.4%	29.9%
Partner outside the EU EEA	2.5%	7.2%	18.4%	21.4%	1.9%	6.2%	9.5%	16.5%	2.4%	6.7%	13.3%	18.0%
Representative office	0.6%	1.9%	2.2%	2.6%	0.3%	2.3%	1.6%	1.1%	0.6%	2.0%	1.8%	1.7%
Sales office	0.8%	3.7%	7.5%	6.1%	0.7%	3.1%	6.7%	4.3%	0.8%	3.4%	7.0%	4.9%
Office to acquire inputs	0.1%	0.3%	0.9%	1.3%	0.0%	0.2%	1.2%	0.4%	0.1%	0.3%	1.0%	0.8%
Local production	1.1%	3.3%	6.6%	6.6%	0.9%	5.0%	3.9%	9.0%	1.1%	4.0%	5.4%	7.8%
Industry/Sector												
Mining and quarrying	-----	-----	-----	-----	-----	-----	-----	-----	1.1%	1.7%	3.0%	3.8%
Electricity, gas, water supply	2.2%	1.8%	0.4%	0.9%	-----	-----	-----	-----	1.9%	1.2%	0.2%	0.4%
Construction	13.8%	7.7%	7.0%	3.1%	-----	-----	-----	-----	12.0%	5.0%	3.2%	1.3%
Sale, maintenance vehicles	4.3%	8.4%	7.5%	6.1%	-----	-----	-----	-----	3.8%	5.4%	3.4%	2.7%
Wholesale trade	5.2%	19.1%	16.7%	14.4%	-----	-----	-----	-----	4.5%	12.2%	7.7%	6.3%
Retail trade	16.4%	16.3%	9.2%	6.1%	-----	-----	-----	-----	14.3%	10.4%	4.2%	2.7%
Hotels / catering	9.6%	1.3%	2.6%	4.8%	-----	-----	-----	-----	8.3%	0.8%	1.2%	2.1%
Transport & communications	6.2%	4.1%	14.0%	17.0%	-----	-----	-----	-----	5.4%	2.6%	6.4%	7.4%
Real estate activities	6.2%	1.3%	0.9%	2.2%	-----	-----	-----	-----	5.4%	0.8%	0.4%	1.0%
Renting of machinery	2.3%	3.2%	2.2%	2.6%	-----	-----	-----	-----	2.0%	2.1%	1.0%	1.1%
Computer activities	3.5%	6.7%	7.0%	7.9%	-----	-----	-----	-----	3.1%	4.3%	3.2%	3.4%

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Variables	Services(a)				Manufacturing(b)				All services(c)			
	1	2	3	4	1	2	3	4	1	2	3	4
Industry/Sector (cont.)												
Research and development	1.2%	3.1%	4.0%	6.1%	-----	-----	-----	-----	1.1%	2.0%	1.8%	2.7%
Human health activities	5.7%	2.7%	2.2%	4.8%	-----	-----	-----	-----	4.9%	1.7%	1.0%	2.1%
Veterinary activities	1.0%	1.4%	2.6%	3.1%	-----	-----	-----	-----	0.9%	0.9%	1.2%	1.3%
Other service activities	4.8%	6.1%	6.1%	7.0%	-----	-----	-----	-----	4.2%	3.9%	2.8%	3.0%
Textiles, clothing, leather	-----	-----	-----	-----	12.3%	8.6%	9.8%	15.1%	1.4%	3.0%	5.0%	8.0%
Food products, beverages	-----	-----	-----	-----	14.5%	14.8%	7.5%	9.3%	1.7%	5.1%	3.8%	4.9%
Furniture, jewellery,	-----	-----	-----	-----	10.2%	10.7%	10.2%	10.4%	1.2%	3.7%	5.2%	5.5%
Wood and paper products	-----	-----	-----	-----	11.5%	10.7%	7.1%	8.2%	1.4%	3.7%	3.6%	4.4%
Publishing, printing	-----	-----	-----	-----	14.6%	10.8%	5.9%	1.8%	1.7%	3.7%	3.0%	1.0%
Coke, petroleum & chemicals	-----	-----	-----	-----	7.7%	13.2%	13.0%	10.4%	0.9%	4.5%	6.6%	5.5%
Metal industry	-----	-----	-----	-----	12.3%	12.7%	19.7%	19.7%	1.4%	4.4%	10.1%	10.4%
Machinery equipment	-----	-----	-----	-----	8.0%	12.7%	16.5%	16.9%	0.9%	4.4%	8.5%	8.9%
Legal & accounting	9.6%	5.5%	6.6%	5.2%	-----	-----	-----	-----	8.3%	3.5%	3.0%	2.3%
Other business activities	8.2%	11.6%	11.0%	8.7%	-----	-----	-----	-----	7.1%	7.4%	5.0%	3.8%
Motor vehicles	-----	-----	-----	-----	9.0%	5.7%	10.2%	8.2%	1.1%	2.0%	5.2%	4.4%
Exports/ export destination												
Cross border regions	-----	51.0%	60.5%	52.4%	-----	53.3%	66.5%	60.2%	-----	51.7%	63.8%	56.4%
Other European Union	-----	72.3%	83.3%	86.5%	-----	78.0%	91.7%	93.9%	-----	74.6%	87.7%	90.7%
Russia	-----	12.0%	27.6%	30.6%	-----	11.7%	30.7%	33.3%	-----	11.9%	29.4%	31.8%
Other European countries	-----	26.1%	50.9%	47.2%	-----	26.8%	44.9%	46.2%	-----	26.4%	47.9%	46.6%
Middle East	-----	10.2%	24.1%	29.7%	-----	13.3%	26.8%	30.8%	-----	11.2%	25.8%	30.1%
North Africa	-----	7.4%	18.9%	21.0%	-----	8.2%	18.9%	22.9%	-----	7.8%	18.9%	22.5%
Other Africa	-----	6.3%	19.3%	25.3%	-----	9.4%	16.9%	21.2%	-----	7.4%	17.7%	22.4%
Japan	-----	4.0%	14.5%	17.9%	-----	2.9%	15.8%	21.5%	-----	3.7%	14.9%	19.5%
China	-----	4.7%	18.0%	20.1%	-----	3.8%	17.3%	26.2%	-----	4.4%	18.1%	23.1%
India	-----	2.7%	16.7%	16.2%	-----	2.9%	15.0%	17.6%	-----	2.8%	15.5%	16.9%
Other Asia	-----	5.4%	22.4%	23.1%	-----	5.7%	18.9%	19.4%	-----	5.5%	20.9%	20.5%
North America	-----	11.3%	29.4%	37.6%	-----	12.0%	28.7%	31.5%	-----	11.5%	29.0%	34.1%
Brazil	-----	3.3%	16.2%	14.9%	-----	3.5%	10.2%	20.1%	-----	3.3%	13.1%	17.1%
Other South and Central America	-----	4.0%	20.6%	18.3%	-----	7.2%	16.1%	19.7%	-----	5.2%	18.5%	18.4%
Australia/New Zealand	-----	4.0%	15.8%	19.7%	-----	5.4%	18.1%	19.0%	-----	4.4%	16.9%	18.8%
Imports												
Cross border regions	8.7%	35.6%	38.2%	27.5%	14.0%	35.0%	43.7%	42.3%	9.4%	35.4%	41.1%	35.6%
Other European Union	21.2%	65.6%	65.8%	52.8%	30.9%	68.5%	70.9%	74.6%	22.4%	66.4%	68.8%	65.0%
Russia	0.7%	5.1%	7.9%	3.9%	1.2%	3.5%	8.7%	6.1%	0.8%	4.6%	8.3%	5.3%
Other European countries	3.2%	18.8%	21.1%	16.2%	4.1%	17.1%	17.7%	21.9%	3.3%	18.1%	19.3%	19.3%
Middle East	1.5%	7.5%	9.2%	5.2%	1.8%	7.5%	7.9%	10.4%	1.5%	7.4%	8.3%	8.1%

Variables	Services(a)				Manufacturing(b)				All services(c)			
	1	2	3	4	1	2	3	4	1	2	3	4
North America	3.9%	18.9%	23.7%	16.2%	5.0%	10.5%	14.2%	16.9%	4.0%	15.9%	18.1%	16.3%
Brazil	0.8%	3.5%	5.7%	2.6%	0.9%	2.3%	2.8%	2.2%	0.8%	3.3%	4.4%	2.5%
Other South and Central America	0.7%	3.3%	5.3%	3.5%	1.6%	2.6%	3.2%	2.9%	0.8%	3.2%	4.4%	3.0%
North Africa	0.4%	2.0%	5.3%	1.3%	0.4%	2.1%	2.8%	4.7%	0.4%	2.2%	4.0%	3.6%
Other Africa	0.4%	2.5%	4.0%	2.6%	1.0%	2.2%	1.6%	3.6%	0.5%	2.6%	3.2%	3.4%
Japan	1.2%	7.7%	10.5%	7.4%	1.0%	3.8%	7.9%	6.5%	1.2%	6.3%	8.9%	6.6%
China	4.9%	21.1%	26.3%	19.2%	6.1%	17.4%	24.4%	23.3%	5.0%	19.7%	25.6%	21.2%
India	1.4%	8.4%	11.0%	7.9%	1.8%	7.6%	9.1%	10.8%	1.5%	8.3%	10.3%	9.5%
Australia/New Zealand	0.5%	2.7%	6.1%	3.5%	0.3%	2.3%	2.0%	2.9%	0.5%	2.5%	3.8%	3.0%
Imports directly from foreign supplier	25.2%	73.7%	76.8%	59.8%	38.0%	76.9%	80.3%	83.9%	26.8%	74.8%	78.9%	73.3%
Number of observations	4,604	1,201	215	212	627	651	233	260	5,362	1,888	463	489

6.7.3. Model 5 data - Exporting experience

Exporting experience was measured as the percentage of time a firm has been exporting of its existence[22], therefore 0% experience applies to firms who have never exported, while 75% experience means three out of four years or six out of eight years. The data is shown here to identify any potential relationships between higher levels of exporting experience with the variables, the percentage of firms that used the variables are given in table 6.5 below.

One of the relationships with higher levels of exporting experience is that firm that having 'no land border' is highest for firms with low amounts of exporting experience with 14.3% of firms with the lowest experience having 'no land border', compared to 9.4% of firms with the highest levels of exporting experience in model (c). Another relationship that stands out in the data is that firms with higher levels of exporting experience use more innovation; 'in-house product innovation' is used by 29.3% of firms for the lowest level of exporting experience compared to 45.6% of firms for the highest level of exporting experience. Additionally 'product innovation that is new for the sector' is used in 26.6% of firms at the lowest level of exporting experience and 38.9% of firms at the highest level of exporting experience.

Other noticeable relationships include 'No e-commerce ability', which is markedly reduced for firms with more exporting experience; 34.9% of firms not using e-commerce are at the lowest levels of exporting experience compared to 21.2% of firms at the highest level of exporting experience. Positive use of e-commerce ability is associated with higher levels of exporting experience with 'online catalogue' at the lowest level of experience only used by 44% of firms compared to 57.4% of firms that are at the highest level of experience; while 'general information online use' is substantially higher for firms with more exporting experience of 59.7% of firms at the lowest level of exporting experience compared to 73.1% for the highest. Also for Model (c) 'Subsidy' is associated more with higher levels of exporting experience with 6.7% of firms using it compared to only 0.8% of firms at lower levels of exporting experience.

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[22] The information is divided into the bands of exporting used a, b, c, d and which is respectively non exporters, 0-33% experience, 33-66% experience, 66-100% experience.

Some regions have higher levels percentages, for example, 'Germany' 2.3% at the lowest to 5.5% of firms at the highest, 'Nordic countries' 8.9% to 10% respectively and 'Central Europe 'which has 7.9% compared to 14.2%. Other regions are associated with low levels of exporting experience, such as; 'Romania & Bulgaria' which have 7.2% of firms at the lowest levels of exporting experience to 5.5% at the highest levels. Amongst other relationships model (c) also shows the relationship between partners show that 'EU partners' is used by 6.5% of firms at the lowest levels of exporting experience, while 23.4% of firms have it at the highest levels, and 'partners in countries outside the EU has 2.4% of firms at the lowest levels and 12.3% at the highest levels of exporting experience.

Table 6.7: Model 5 data – Comparison between different levels of exporting experience

Variables	Services				Manufacturing				All sectors			
	A	B	C	D	A	B	C	D	A	B	C	D
Age of firm												
Recently created	21.1%	8.0%	15.8%	17.4%	16.8%	4.5%	10.4%	16.1%	20.2%	6.3%	13.5%	16.7%
Medium age	47.1%	44.3%	48.1%	56.6%	47.8%	31.6%	40.9%	52.9%	46.9%	38.5%	45.0%	55.3%
Oldest age	31.8%	47.7%	36.1%	26.0%	35.4%	64.0%	48.8%	31.1%	32.9%	55.2%	41.5%	28.0%
Distance from border												
Close to border	34.4%	29.4%	29.9%	26.8%	37.3%	32.0%	34.8%	31.1%	35.0%	30.8%	31.6%	28.7%
Medium distance from border	27.3%	29.4%	34.0%	32.2%	25.4%	30.0%	31.2%	31.4%	26.9%	29.4%	33.4%	31.7%
Far from border	22.4%	27.5%	23.0%	30.2%	21.9%	21.5%	24.4%	29.4%	22.3%	25.1%	23.1%	29.9%
No land border	14.2%	13.5%	12.7%	10.4%	14.4%	16.2%	9.3%	8.0%	14.3%	14.4%	11.3%	9.4%
Innovation												
Process innovation new for sector	6.3%	17.7%	17.2%	15.3%	8.5%	15.4%	15.8%	15.7%	6.4%	16.6%	16.5%	15.5%
Process innovation new for enterprise	14.2%	22.3%	29.2%	23.2%	19.0%	34.0%	27.2%	28.8%	14.8%	27.0%	28.4%	25.4%
Product innovation themselves	19.9%	39.1%	44.7%	39.6%	32.8%	50.6%	55.9%	54.3%	21.3%	43.8%	49.2%	45.5%
Product innovation new for sector	14.5%	34.3%	36.8%	36.2%	20.1%	32.4%	36.6%	38.1%	15.0%	33.2%	36.7%	36.8%
Product innovation new for enterprise	17.6%	22.6%	28.7%	22.5%	22.3%	29.6%	30.8%	26.8%	18.0%	25.3%	29.5%	24.5%
Technological co-operation	10.4%	22.3%	29.9%	31.3%	10.6%	21.9%	28.3%	31.4%	10.2%	22.2%	29.2%	31.2%
Subcontracting												
Foreign subcontractor	8.5%	16.2%	28.7%	31.4%	5.8%	15.4%	22.9%	26.1%	8.0%	15.6%	26.4%	29.1%
E-commerce ability												
No e-commerce ability	35.2%	20.8%	14.4%	21.4%	33.1%	16.6%	21.2%	20.0%	34.9%	19.3%	17.2%	21.2%
Fully e-commerce	9.7%	14.4%	13.6%	14.8%	9.2%	15.4%	12.5%	8.7%	9.6%	14.7%	13.1%	12.0%
Online catalogue	44.0%	54.4%	62.9%	56.7%	44.0%	59.5%	58.1%	59.0%	44.0%	56.4%	60.8%	57.4%
Orders online	20.6%	25.4%	30.9%	25.0%	22.0%	29.6%	28.7%	28.3%	20.7%	26.7%	30.0%	26.5%
Online only	0.5%	0.6%	1.7%	1.2%	0.3%	0.8%	0.4%	0.9%	0.5%	0.7%	1.1%	1.1%
General information	59.4%	73.4%	81.3%	73.4%	61.8%	75.7%	73.1%	73.8%	59.7%	73.9%	78.0%	73.1%
Other forms	1.1%	0.3%	0.7%	0.8%	0.7%	1.6%	0.7%	0.7%	1.0%	0.9%	0.7%	0.8%
Public sector support												
Subsidy	0.7%	2.5%	5.7%	5.2%	2.2%	9.7%	7.2%	8.7%	0.8%	5.6%	6.4%	6.7%
Information	0.6%	2.1%	2.9%	2.5%	0.7%	4.9%	2.9%	4.1%	0.6%	3.3%	2.8%	3.1%
Productivity/employment												
Turnover £(000's) per worker	90.49	107.04	121.42	128.41	88.34	104.82	103.67	83.70	90.94	105.24	113.44	106.62
Number of people employed	14.4	25.2	23.7	18.1	14.8	33.4	34.4	35.4	14.5	28.9	27.7	24.1

Variables	Services				Manufacturing				All sectors			
	A	B	C	D	A	B	C	D	A	B	C	D
Region/ domestic market												
France	7.1%	5.2%	3.1%	4.1%	7.7%	4.1%	4.7%	4.4%	7.2%	4.8%	3.7%	4.3%
UK	7.1%	5.5%	5.7%	5.1%	8.0%	10.9%	5.0%	3.9%	7.3%	7.7%	5.4%	4.6%
Poland	6.7%	6.1%	7.4%	5.9%	7.3%	10.1%	6.8%	4.6%	6.8%	8.0%	7.3%	5.5%
Nordic countries	9.2%	10.1%	11.0%	11.9%	8.3%	3.2%	11.1%	12.0%	9.1%	7.2%	10.9%	11.8%
Benelux	6.7%	8.0%	6.7%	11.7%	7.0%	8.5%	7.2%	8.9%	6.8%	8.0%	6.9%	10.5%
Central Europe	8.7%	8.6%	9.1%	11.3%	6.9%	5.7%	7.5%	14.4%	8.5%	7.2%	8.6%	12.8%
Romania & Bulgaria	7.2%	4.6%	5.3%	4.8%	7.9%	5.3%	5.7%	6.7%	7.2%	5.0%	5.4%	5.5%
Remaining countries	26.9%	36.7%	34.5%	30.9%	28.7%	28.7%	30.8%	27.7%	26.9%	33.7%	33.0%	29.5%
Italy	6.4%	3.7%	4.8%	5.6%	5.1%	7.3%	6.1%	6.7%	6.4%	5.1%	5.4%	6.1%
Germany	6.9%	5.2%	5.7%	3.7%	6.9%	8.5%	6.1%	4.8%	7.0%	6.5%	5.8%	4.2%
Spain	7.0%	6.4%	6.7%	5.1%	6.3%	7.7%	9.0%	5.9%	6.9%	6.8%	7.8%	5.4%
Activity abroad												
Invested abroad	4.5%	14.4%	16.3%	14.8%	2.3%	11.3%	16.1%	17.0%	4.1%	13.0%	16.1%	15.7%
Own country Partner	22.9%	30.9%	31.8%	30.2%	22.7%	25.9%	24.7%	23.8%	23.0%	28.7%	28.5%	27.6%
EU Partner	6.8%	16.2%	22.5%	25.6%	5.4%	17.0%	18.6%	20.7%	6.5%	16.4%	20.9%	23.4%
Countries outside the EU EEA Partner	2.5%	7.7%	10.3%	13.9%	1.9%	6.1%	8.2%	10.5%	2.4%	6.8%	9.3%	12.3%
Representative office	0.7%	2.1%	2.6%	1.6%	0.4%	2.4%	2.2%	1.3%	0.6%	2.2%	2.4%	1.4%
Sales office	0.9%	4.0%	5.3%	4.4%	0.9%	4.1%	4.7%	4.3%	0.8%	3.9%	4.9%	4.3%
Office to acquire inputs	0.1%	0.6%	0.2%	0.8%	0.0%	0.4%	0.7%	0.4%	0.1%	0.5%	0.4%	0.6%
Local production	1.2%	4.3%	4.3%	4.5%	0.9%	2.0%	5.4%	7.0%	1.1%	3.3%	4.8%	5.6%
Industry												
Mining and quarrying	-----	-----	-----	-----	-----	-----	-----	-----	1.1%	1.7%	1.8%	2.1%
Electricity, gas, water supply	2.1%	2.1%	2.4%	0.9%	-----	-----	-----	-----	1.9%	1.2%	1.4%	0.5%
Construction	13.8%	8.0%	8.4%	5.7%	-----	-----	-----	-----	12.0%	4.4%	4.9%	3.3%
Sale, maintenance of motor vehicles	4.3%	5.5%	8.4%	9.3%	-----	-----	-----	-----	3.7%	3.1%	4.9%	5.3%
Wholesale trade	5.2%	18.4%	16.0%	18.6%	-----	-----	-----	-----	4.5%	10.3%	9.5%	10.7%
Retail trade	16.4%	19.3%	15.1%	10.4%	-----	-----	-----	-----	14.3%	10.8%	8.9%	5.9%
Hotels / catering	9.5%	2.1%	1.0%	2.1%	-----	-----	-----	-----	8.4%	1.2%	0.6%	1.2%
Transport and communications	6.2%	3.4%	8.1%	8.9%	-----	-----	-----	-----	5.4%	1.9%	4.8%	5.1%
Real estate activities	6.2%	1.2%	1.4%	1.2%	-----	-----	-----	-----	5.4%	0.7%	0.9%	0.7%
Renting of machinery	2.3%	3.7%	3.1%	2.9%	-----	-----	-----	-----	2.0%	2.1%	1.8%	1.7%

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Variables	Services				Manufacturing				All sectors			
	A	B	C	D	A	B	C	D	A	B	C	D
<u>Region/ domestic market</u>												
France	7.1%	5.2%	3.1%	4.1%	7.7%	4.1%	4.7%	4.4%	7.2%	4.8%	3.7%	4.3%
UK	7.1%	5.5%	5.7%	5.1%	8.0%	10.9%	5.0%	3.9%	7.3%	7.7%	5.4%	4.6%
Poland	6.7%	6.1%	7.4%	5.9%	7.3%	10.1%	6.8%	4.6%	6.8%	8.0%	7.3%	5.5%
Nordic countries	9.2%	10.1%	11.0%	11.9%	8.3%	3.2%	11.1%	12.0%	9.1%	7.2%	10.9%	11.8%
Benelux	6.7%	8.0%	6.7%	11.7%	7.0%	8.5%	7.2%	8.9%	6.8%	8.0%	6.9%	10.5%
Central Europe	8.7%	8.6%	9.1%	11.3%	6.9%	5.7%	7.5%	14.4%	8.5%	7.2%	8.6%	12.8%
Romania & Bulgaria	7.2%	4.6%	5.3%	4.8%	7.9%	5.3%	5.7%	6.7%	7.2%	5.0%	5.4%	5.5%
Remaining countries	26.9%	36.7%	34.5%	30.9%	28.7%	28.7%	30.8%	27.7%	26.9%	33.7%	33.0%	29.5%
Italy	6.4%	3.7%	4.8%	5.6%	5.1%	7.3%	6.1%	6.7%	6.4%	5.1%	5.4%	6.1%
Germany	6.9%	5.2%	5.7%	3.7%	6.9%	8.5%	6.1%	4.8%	7.0%	6.5%	5.8%	4.2%
Spain	7.0%	6.4%	6.7%	5.1%	6.3%	7.7%	9.0%	5.9%	6.9%	6.8%	7.8%	5.4%
<u>Activity abroad</u>												
Invested abroad	4.5%	14.4%	16.3%	14.8%	2.3%	11.3%	16.1%	17.0%	4.1%	13.0%	16.1%	15.7%
Own country Partner	22.9%	30.9%	31.8%	30.2%	22.7%	25.9%	24.7%	23.8%	23.0%	28.7%	28.5%	27.6%
EU Partner	6.8%	16.2%	22.5%	25.6%	5.4%	17.0%	18.6%	20.7%	6.5%	16.4%	20.9%	23.4%
Countries outside the EU EEA Partner	2.5%	7.7%	10.3%	13.9%	1.9%	6.1%	8.2%	10.5%	2.4%	6.8%	9.3%	12.3%
Representative office	0.7%	2.1%	2.6%	1.6%	0.4%	2.4%	2.2%	1.3%	0.6%	2.2%	2.4%	1.4%
Sales office	0.9%	4.0%	5.3%	4.4%	0.9%	4.1%	4.7%	4.3%	0.8%	3.9%	4.9%	4.3%
Office to acquire inputs	0.1%	0.6%	0.2%	0.8%	0.0%	0.4%	0.7%	0.4%	0.1%	0.5%	0.4%	0.6%
Local production	1.2%	4.3%	4.3%	4.5%	0.9%	2.0%	5.4%	7.0%	1.1%	3.3%	4.8%	5.6%
<u>Industry</u>												
Mining and quarrying	-----	-----	-----	-----	-----	-----	-----	-----	1.1%	1.7%	1.8%	2.1%
Electricity, gas, water supply	2.1%	2.1%	2.4%	0.9%	-----	-----	-----	-----	1.9%	1.2%	1.4%	0.5%
Construction	13.8%	8.0%	8.4%	5.7%	-----	-----	-----	-----	12.0%	4.4%	4.9%	3.3%
Sale, maintenance of motor vehicles	4.3%	5.5%	8.4%	9.3%	-----	-----	-----	-----	3.7%	3.1%	4.9%	5.3%
Wholesale trade	5.2%	18.4%	16.0%	18.6%	-----	-----	-----	-----	4.5%	10.3%	9.5%	10.7%
Retail trade	16.4%	19.3%	15.1%	10.4%	-----	-----	-----	-----	14.3%	10.8%	8.9%	5.9%
Hotels / catering	9.5%	2.1%	1.0%	2.1%	-----	-----	-----	-----	8.4%	1.2%	0.6%	1.2%
Transport and communications	6.2%	3.4%	8.1%	8.9%	-----	-----	-----	-----	5.4%	1.9%	4.8%	5.1%
Real estate activities	6.2%	1.2%	1.4%	1.2%	-----	-----	-----	-----	5.4%	0.7%	0.9%	0.7%
Renting of machinery	2.3%	3.7%	3.1%	2.9%	-----	-----	-----	-----	2.0%	2.1%	1.8%	1.7%

Variables	Services				Manufacturing				All sectors			
	A	B	C	D	A	B	C	D	A	B	C	D
Region/ domestic market												
Human health activities	5.5%	2.8%	4.1%	2.0%	-----	-----	-----	-----	4.9%	1.5%	2.4%	1.1%
Research and development	1.2%	2.5%	3.4%	4.8%	-----	-----	-----	-----	1.1%	1.4%	2.0%	2.7%
Veterinary activities	1.0%	1.8%	1.9%	1.6%	-----	-----	-----	-----	0.9%	1.0%	1.1%	0.9%
Other service activities	4.8%	8.6%	3.8%	5.9%	-----	-----	-----	-----	4.2%	4.8%	2.3%	3.3%
Legal and accounting	9.5%	4.6%	4.3%	6.7%	-----	-----	-----	-----	8.4%	2.6%	2.5%	3.8%
Other business activities	8.4%	9.2%	12.0%	11.9%	-----	-----	-----	-----	7.2%	5.1%	7.1%	6.7%
Food products/beverages	-----	-----	-----	-----	14.9%	19.0%	9.0%	9.6%	1.7%	8.0%	3.5%	3.9%
Textiles, clothing, leather	-----	-----	-----	-----	12.0%	9.7%	10.4%	11.3%	1.4%	4.1%	4.1%	4.6%
Wood and paper products	-----	-----	-----	-----	11.7%	7.7%	11.8%	8.1%	1.4%	3.3%	4.7%	3.3%
Publishing, printing	-----	-----	-----	-----	14.4%	13.8%	7.9%	5.6%	1.7%	5.8%	3.1%	2.3%
Coke, petroleum products	-----	-----	-----	-----	7.6%	10.5%	13.3%	12.2%	0.9%	4.4%	5.2%	5.0%
Metal industry	-----	-----	-----	-----	12.0%	14.6%	14.7%	17.4%	1.4%	6.2%	5.8%	7.1%
Machinery	-----	-----	-----	-----	8.2%	8.1%	16.1%	16.6%	0.9%	3.4%	6.4%	6.8%
Motor vehicles	-----	-----	-----	-----	9.2%	8.1%	8.2%	6.3%	1.1%	3.4%	3.2%	2.6%
Miscellaneous manuf.	-----	-----	-----	-----	10.2%	8.5%	8.6%	12.9%	1.2%	3.8%	3.2%	5.3%
Imports from												
Imports directly from foreign supplier	25.5%	69.4%	76.8%	72.6%	38.2%	73.3%	78.5%	83.0%	26.7%	71.3%	77.4%	77.1%
Cross border regions	8.8%	29.7%	37.1%	35.4%	14.1%	28.7%	37.6%	42.1%	9.4%	29.2%	37.5%	38.2%
Other European Union	21.4%	60.2%	68.4%	65.3%	31.1%	66.0%	69.5%	73.6%	22.4%	62.9%	68.7%	69.0%
Russia	0.8%	4.9%	4.3%	5.9%	1.2%	2.0%	4.7%	7.4%	0.8%	3.9%	4.4%	6.4%
Other European countries	3.3%	16.2%	18.9%	19.3%	3.9%	17.0%	16.1%	19.6%	3.3%	16.8%	17.9%	19.2%
Middle East	1.5%	7.7%	6.2%	7.9%	1.8%	5.3%	7.5%	10.5%	1.5%	6.5%	6.8%	9.0%
North Africa	0.4%	1.8%	1.7%	2.9%	0.4%	3.6%	1.4%	3.0%	0.4%	2.6%	1.6%	3.3%
Other Africa	0.4%	2.5%	2.4%	2.8%	1.0%	2.0%	1.1%	3.0%	0.5%	2.4%	1.8%	3.1%
Japan	1.1%	6.7%	7.9%	9.5%	1.0%	2.8%	5.7%	6.7%	1.1%	5.0%	6.9%	8.2%
China	5.0%	21.1%	23.4%	21.8%	6.3%	13.0%	20.1%	24.6%	5.1%	17.3%	21.9%	23.2%
India	1.4%	7.7%	8.1%	9.3%	1.8%	7.7%	6.1%	10.2%	1.5%	7.7%	7.3%	9.9%
Other Asia	2.1%	13.2%	14.4%	14.3%	2.9%	7.7%	10.8%	11.3%	2.1%	10.6%	12.7%	12.7%
North America	4.0%	16.2%	22.3%	19.3%	5.0%	8.1%	11.8%	15.5%	4.0%	12.7%	17.9%	17.5%
Brazil	0.9%	2.8%	4.1%	3.5%	0.9%	1.2%	1.8%	3.1%	0.8%	2.2%	3.2%	3.5%
Other South/central America	0.7%	3.4%	3.4%	3.7%	1.6%	2.8%	1.8%	2.8%	0.8%	3.1%	2.7%	3.5%
Australia/New Zealand	0.5%	2.1%	3.1%	3.6%	0.6%	2.4%	1.4%	3.1%	0.5%	2.2%	2.4%	3.3%
Number of observations	4,589	1,029	194	400	628	573	203	312	5,278	1,626	408	726

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6.7.4. Model 6 data - Exporting age

Table 6.8 below shows the differences between exporters that have been exporting for different periods of time[23] (figures are percentages unless shown). The data for model (c) shows that, increased use of innovation is associated with older exporters and is at lower levels for younger exporters or non exporters, for example, 'product innovation in-house' is used by 49.3% of the oldest exporters compared to 21.8% of non exporters. Another strong relationship that shows itself is that 'no e-commerce ability' is associated with having a lower mean for the oldest exporters only 16.1 % of these firms have it compared to 34.3% of the non exporters; other e-commerce abilities, such as 'online catalogue' is used by 61% of the oldest exporters but only 44.4% of the non exporters. Subsidy is linked with exporters that have been exporting longer, 7% of the oldest exporters have received it compared to only 1% of the non exporters, while 3.9% of the oldest exporters have received' information' to export compared to 0.7% of the non exporters. Model (c) shows that the highest average turnover of firms is the exporters who have been exporting the longest compared to other exporters and non exporters. Another relationship that shows itself is that the oldest exporters have a higher percentage that have come from 'Italy' of 10.7% compared to the other exporters and none exporters of which 6.9% of non exporters are Italian.

Having partners that are not domestic seems to be related to older exporters 21.3% of the oldest exporters have' partners in the EU' compared to 6.7% of non exporters, while 5.5% of the oldest exporters have 'sales offices abroad' compared to 0.9% of non exporters. Some sectors, such as the sale of vehicles of which for the oldest exporters 5.8% compared to 3.7% of non exporters.

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[23] The information is divided into the bands of exporting used a, b, c, d and e which is resepctively non exporters, Started exporting 2002 -2008, Started exporting 1996-2002, Started exporting 1989-1996 and Exporting before 1989.

Table 6.8: Model 6 data – Comparisons between different lengths of time exporting

Variables	Services					Manufacturing					All sectors				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Distance from border															
Close to border	27.4%	31.2%	35.7%	33.2%	28.1%	25.9%	35.7%	29.0%	31.7%	29.2%	27.2%	32.7%	31.6%	32.7%	28.5%
Medium distance	22.5%	27.9%	26.5%	29.3%	25.5%	22.3%	24.7%	30.1%	30.7%	21.1%	22.4%	26.8%	27.2%	30.0%	23.5%
Far from border	13.9%	12.8%	10.7%	10.4%	12.8%	13.2%	10.6%	9.0%	5.8%	13.9%	13.8%	11.9%	10.5%	8.4%	13.1%
No land border	27.4%	31.2%	35.7%	33.2%	28.1%	25.9%	35.7%	29.0%	31.7%	29.2%	27.2%	32.7%	31.6%	32.7%	28.5%
Innovation															
Process innovation new for sector	6.3%	18.4%	16.5%	15.7%	14.5%	9.4%	14.1%	15.8%	15.7%	16.3%	6.7%	16.8%	15.3%	15.6%	15.2%
Process innovation new for enterprise	14.4%	23.8%	23.3%	25.2%	24.9%	19.4%	33.0%	27.8%	30.7%	28.0%	15.1%	26.6%	26.2%	27.5%	26.3%
Product innovation in-house	19.8%	40.0%	43.2%	40.2%	38.8%	35.0%	46.3%	51.5%	52.6%	61.5%	21.8%	41.9%	48.5%	45.0%	49.3%
Product innovation new for sector	14.5%	34.2%	35.7%	40.9%	31.2%	21.3%	30.4%	35.3%	37.9%	39.2%	15.4%	32.8%	37.0%	39.2%	34.9%
Product innovation new for enterprise	17.6%	23.6%	26.7%	22.0%	26.6%	23.0%	30.0%	29.7%	25.6%	29.2%	18.3%	25.4%	27.6%	23.8%	27.8%
Subcontracting inputs															
Subcontractor to a main contractor	8.8%	23.6%	24.0%	27.4%	20.4%	7.9%	19.8%	23.7%	29.0%	16.6%	8.7%	22.2%	24.1%	28.2%	18.0%
Foreign subcontractor	8.5%	21.8%	26.5%	30.0%	32.0%	8.0%	14.5%	19.6%	24.9%	28.6%	8.4%	19.3%	22.3%	27.8%	29.9%
E-commerce ability															
No e-commerce	34.9%	21.4%	21.6%	20.6%	16.4%	31.0%	27.8%	20.7%	18.8%	16.0%	34.3%	23.5%	19.7%	20.4%	16.1%
Fully e-commerce	9.6%	11.2%	14.1%	15.3%	16.7%	9.4%	10.1%	11.7%	11.6%	9.9%	9.5%	10.9%	13.1%	13.4%	13.5%
Online catalogue	44.1%	56.2%	57.0%	58.1%	58.4%	45.9%	50.2%	56.4%	60.4%	63.3%	44.4%	54.0%	57.3%	58.8%	61.0%
Orders online	20.4%	26.5%	26.9%	29.8%	22.1%	21.9%	26.0%	30.5%	29.0%	25.9%	20.5%	26.0%	29.0%	29.1%	24.4%
Online only	0.5%	1.4%	1.7%	1.5%	0.9%	0.3%	0.4%	1.1%	0.3%	0.9%	0.5%	1.0%	1.2%	1.0%	1.0%
General information	59.7%	73.0%	73.5%	75.1%	77.3%	63.5%	65.6%	73.7%	76.5%	76.2%	60.3%	70.3%	76.1%	75.0%	76.9%
Other forms	1.1%	0.5%	1.2%	0.2%	1.1%	0.8%	1.8%	0.4%	0.7%	1.2%	1.1%	0.9%	0.8%	0.4%	1.1%
Public sector support															
Subsidy	0.7%	4.7%	3.9%	4.4%	6.2%	2.8%	5.7%	6.8%	11.6%	8.1%	1.0%	5.3%	5.8%	7.5%	7.0%
Information	0.7%	2.7%	1.2%	3.2%	3.1%	0.7%	3.5%	2.6%	3.8%	5.1%	0.7%	2.9%	1.6%	3.3%	3.9%
Labour productivity															
Turnover £(000's)	92.04	88.43	123.62	113.44	183.32	97.25	85.82	70.76	71.11	145.51	93.06	87.55	92.04	88.43	123.62
Number of worker	14.6	16.9	19.2	22.3	26.9	16.7	23.9	32.9	39.7	41.5	15.0	19.1	14.6	16.9	19.2
Region															
Italy	6.9%	2.5%	5.3%	3.4%	9.6%	6.5%	3.5%	4.9%	5.8%	11.8%	6.9%	2.9%	7.0%	4.3%	10.7%
Germany	7.0%	4.5%	5.1%	4.1%	5.1%	7.0%	3.1%	2.3%	6.8%	9.9%	7.0%	4.0%	1.4%	5.1%	7.5%
Spain	6.9%	6.1%	3.6%	5.3%	9.4%	6.7%	6.2%	7.5%	5.1%	9.0%	6.9%	6.2%	7.0%	5.3%	9.3%
France	7.3%	3.4%	3.2%	3.9%	6.2%	8.1%	5.3%	4.1%	4.4%	4.8%	7.4%	4.0%	1.0%	4.0%	5.8%

Variables	Services					Manufacturing					All sectors				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Region/ domestic market(cont.)															
UK	7.0%	4.5%	5.6%	5.1%	6.5%	7.4%	5.7%	4.5%	2.4%	9.3%	7.1%	4.9%	7.0%	4.0%	7.8%
Poland	6.6%	8.8%	6.1%	6.3%	2.6%	6.3%	11.0%	8.7%	6.1%	1.5%	6.5%	9.7%	10.1%	6.4%	2.0%
Nordic countries	9.2%	7.2%	10.9%	11.4%	17.3%	8.8%	4.4%	4.1%	8.5%	19.0%	9.1%	6.2%	6.4%	10.1%	17.6%
Benelux	6.9%	4.0%	6.6%	7.3%	22.4%	8.1%	6.2%	4.1%	4.8%	15.4%	7.0%	4.7%	5.4%	6.1%	18.6%
Central Europe	8.7%	8.5%	9.2%	19.1%	1.4%	7.1%	10.6%	14.3%	16.7%	2.4%	8.5%	9.3%	10.7%	18.4%	2.0%
Romania & Bulgaria	7.0%	7.9%	5.8%	5.6%	0.0%	6.8%	7.9%	8.7%	8.2%	0.9%	7.0%	7.9%	5.6%	6.5%	0.4%
Remaining countries	26.6%	42.7%	38.6%	28.6%	19.6%	27.2%	36.1%	36.8%	31.1%	16.0%	26.6%	40.3%	38.2%	30.0%	18.5%
EU	88.4%	83.8%	85.4%	87.9%	91.5%	87.9%	86.8%	85.0%	90.4%	93.4%	88.4%	84.9%	84.7%	88.8%	92.4%
Activity abroad															
Own country Partner	22.8%	34.6%	27.9%	32.5%	25.5%	24.1%	24.2%	25.9%	26.6%	22.3%	23.1%	30.7%	27.4%	30.1%	23.7%
EU or EEA Member State Partner	6.7%	19.8%	23.5%	23.7%	21.8%	6.7%	16.7%	19.2%	19.5%	20.8%	6.7%	18.5%	22.7%	21.7%	21.3%
Countries outside the EU / EEA Partner	2.5%	8.1%	12.1%	12.1%	12.2%	3.1%	5.3%	7.1%	10.9%	11.5%	2.6%	7.1%	11.7%	11.3%	11.4%
Representative office	0.7%	2.5%	1.9%	1.0%	2.8%	0.5%	2.6%	2.3%	1.7%	1.2%	0.6%	2.5%	1.6%	1.2%	2.0%
Sales office	0.9%	4.3%	5.8%	3.6%	4.5%	0.9%	2.6%	4.1%	2.7%	6.9%	0.9%	3.7%	5.6%	3.2%	5.5%
Office to acquire inputs	0.1%	0.5%	1.0%	0.5%	0.3%	0.0%	0.4%	1.1%	0.3%	0.0%	0.1%	0.4%	1.4%	0.4%	0.1%
Local production	1.1%	3.2%	3.2%	4.6%	6.8%	2.2%	1.3%	2.6%	4.4%	10.5%	1.3%	2.5%	2.6%	4.6%	8.9%
Industry															
Mining and quarrying	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.2%	1.2%	1.8%	2.5%	3.5%
Electricity, gas, supply	2.2%	2.5%	1.9%	0.7%	0.9%	-----	-----	-----	-----	-----	1.9%	1.6%	0.8%	0.4%	0.4%
Construction	13.6%	9.4%	7.8%	5.6%	5.1%	-----	-----	-----	-----	-----	11.7%	6.2%	4.6%	3.2%	2.5%
Sale, maintenance of vehicles	4.3%	4.9%	8.7%	7.8%	11.6%	-----	-----	-----	-----	-----	3.7%	3.2%	4.6%	4.4%	5.8%
Wholesale trade	5.6%	14.2%	18.0%	18.9%	21.0%	-----	-----	-----	-----	-----	4.8%	9.3%	10.5%	10.8%	10.4%
Retail trade	16.4%	18.4%	13.4%	12.4%	10.5%	-----	-----	-----	-----	-----	14.1%	12.1%	6.4%	7.0%	5.2%
Hotels / catering	9.4%	2.5%	1.9%	0.5%	3.1%	-----	-----	-----	-----	-----	8.0%	1.6%	1.2%	0.3%	1.6%
Transport and communications	6.1%	3.4%	7.3%	8.2%	11.3%	-----	-----	-----	-----	-----	5.2%	2.2%	4.2%	4.7%	5.6%
Real estate activities	6.1%	1.8%	1.0%	1.5%	0.9%	-----	-----	-----	-----	-----	5.3%	1.2%	0.4%	0.8%	0.4%
Renting of machinery	2.3%	2.9%	2.4%	4.1%	2.6%	-----	-----	-----	-----	-----	2.0%	1.9%	1.6%	2.4%	1.3%
Computer activities	3.6%	8.8%	8.0%	5.8%	5.1%	-----	-----	-----	-----	-----	3.1%	5.7%	3.8%	3.3%	2.5%
Research and development	1.3%	3.4%	3.9%	3.4%	4.0%	-----	-----	-----	-----	-----	1.1%	2.2%	2.0%	1.9%	2.0%
Legal and accounting	9.5%	6.5%	5.6%	5.1%	4.5%	-----	-----	-----	-----	-----	8.2%	4.3%	3.0%	2.9%	2.3%
Other business activities	8.2%	12.6%	12.1%	12.6%	6.8%	-----	-----	-----	-----	-----	7.1%	8.2%	7.9%	7.2%	3.4%

Variables	Services					Manufacturing					All sectors				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Industry (cont.)															
Human health activities	5.6%	2.3%	2.9%	3.2%	3.1%	-----	-----	-----	-----	-----	4.8%	1.5%	1.0%	1.8%	1.6%
Veterinary activities	1.1%	1.1%	1.0%	1.9%	2.8%	-----	-----	-----	-----	-----	0.9%	0.7%	0.6%	1.1%	1.4%
Other service activities	4.8%	5.4%	4.1%	8.5%	6.8%	-----	-----	-----	-----	-----	4.2%	3.5%	2.4%	4.8%	3.4%
Publishing, printing	-----	-----	-----	-----	-----	13.4%	11.0%	10.2%	6.8%	5.1%	1.7%	3.7%	4.6%	2.8%	2.4%
Coke, petroleum chemicals	-----	-----	-----	-----	-----	9.0%	8.8%	14.3%	12.3%	12.1%	1.2%	2.9%	6.4%	5.0%	5.6%
Metal industry	-----	-----	-----	-----	-----	12.4%	15.9%	15.4%	15.7%	16.9%	1.6%	5.3%	6.6%	6.4%	7.9%
Machinery	-----	-----	-----	-----	-----	8.9%	7.9%	15.4%	18.4%	14.5%	1.2%	2.7%	6.6%	7.5%	6.8%
Motor vehicles	-----	-----	-----	-----	-----	8.7%	8.4%	7.5%	6.8%	6.9%	1.1%	2.8%	3.0%	2.8%	3.2%
Miscellaneous manuf.	-----	-----	-----	-----	-----	10.1%	12.8%	7.1%	11.3%	11.5%	1.3%	4.3%	2.6%	4.6%	5.4%
Food products/beverages	-----	-----	-----	-----	-----	14.3%	17.2%	10.5%	9.6%	11.5%	1.9%	5.7%	4.0%	3.9%	5.4%
Textiles, clothing, leather	-----	-----	-----	-----	-----	11.5%	6.6%	9.4%	10.6%	14.8%	1.5%	2.2%	4.4%	4.3%	6.9%
Wood and paper products	-----	-----	-----	-----	-----	11.7%	11.5%	10.2%	8.5%	6.9%	1.5%	3.8%	4.6%	3.5%	3.2%
Imports															
Cross border regions	9.4%	27.9%	29.9%	35.6%	45.9%	18.7%	30.0%	32.7%	38.9%	44.9%	10.7%	28.7%	30.2%	37.3%	45.1%
Other European Union	22.1%	57.8%	63.8%	70.0%	65.2%	36.5%	63.4%	69.9%	73.4%	71.4%	24.1%	60.0%	66.0%	71.1%	67.9%
Russia	0.9%	4.7%	6.8%	4.4%	4.8%	1.6%	3.1%	5.3%	7.2%	5.1%	1.0%	4.3%	6.2%	5.5%	5.1%
Other European countries	3.6%	13.5%	20.2%	19.4%	21.5%	6.5%	12.8%	14.7%	20.8%	21.7%	4.0%	13.2%	15.7%	19.8%	21.7%
Middle East	1.6%	5.2%	8.0%	8.7%	7.9%	2.6%	4.9%	9.4%	8.5%	9.3%	1.7%	5.0%	9.1%	8.6%	8.6%
North Africa	0.4%	1.8%	1.7%	1.9%	4.5%	1.0%	1.3%	1.9%	3.1%	3.6%	0.5%	1.6%	1.6%	2.5%	4.5%
Other Africa	0.5%	1.6%	1.9%	2.7%	4.5%	1.3%	0.9%	1.5%	3.1%	3.3%	0.6%	1.3%	1.8%	2.9%	4.7%
Japan	1.2%	4.0%	7.5%	8.7%	14.2%	1.4%	1.3%	5.6%	5.8%	7.5%	1.3%	3.1%	7.2%	7.3%	10.7%
China	5.3%	16.6%	22.8%	21.6%	26.6%	7.9%	11.9%	18.1%	16.4%	31.0%	5.6%	14.9%	21.7%	19.5%	28.7%
India	1.6%	5.8%	7.3%	8.5%	13.3%	2.8%	2.6%	6.8%	6.5%	15.7%	1.8%	4.7%	8.5%	7.5%	15.1%
other Asia	2.2%	10.3%	13.6%	15.0%	16.4%	3.6%	4.9%	10.5%	7.9%	15.7%	2.4%	8.4%	12.9%	11.7%	15.5%
North America	4.2%	14.8%	16.0%	19.4%	27.8%	5.9%	4.4%	12.4%	13.3%	18.4%	4.5%	11.2%	15.7%	16.6%	22.7%
Brazil	0.9%	2.0%	3.6%	4.6%	4.5%	1.2%	0.9%	1.5%	1.4%	4.8%	0.9%	1.6%	3.6%	3.2%	5.4%
Other South and Central America	0.8%	2.7%	4.4%	2.4%	4.5%	2.1%	0.4%	1.9%	2.7%	4.5%	1.0%	1.9%	3.4%	2.6%	4.9%
Australia/New Zealand	0.6%	0.9%	2.9%	3.2%	6.5%	0.3%	1.8%	1.1%	3.8%	3.3%	0.6%	1.2%	2.4%	3.3%	4.8%
Number of observations	5,063	561	470	479	665	682	269	304	325	520	5,811	838	786	823	1,222

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6.8. Model 4 - Heckman

This thesis has examined the determinants of exporting in chapter 4, using the GCS 2006 and also a survey sent out to firms in Scotland. To extend the research data from the EIDCC has been used; the firms that were exporters gave values of the amount of exporting that they did as a percentage of their turnover which is used to measure the exporting intensity of the firm.

Economic theory, such as Melitz (2003), suggests that firms self-select into exporting and using OLS estimations would not take into account firms with non-zero exporting levels. The only information is for the firms who had positive exporting intensity, while if they do not export the values of their export intensity are zero and this may lead to sample selection bias. The variables acting on the sample of firms that does export may have different effects than the variables acting on the population as a whole (including non exporters). There is a possibility that the selected sub-sample of firms with positive exports is non-random and the unobservable factors determining export propensity are correlated with the unobservable factors determining export intensity.

Due to possible sample selection bias many other studies have used have used a Heckman model, such as Harris and Li (2009) and Bellone et al. (2010) ,Correa et al. (2012) . Heckman (1979)[24] and Heckman (1976) propose and discuss sample selection bias including a two-stage estimation to take account of bias the selection equation uses the variables that select into exporting while the outcome equation estimates the variables that effect the level of exporting intensity; Model 4 was separated into (a) services, (b) manufacturing and (c) all industries.[25] A stepwise procedure was used removing variables with a p- value above 0.2 and if the p-value for the variable was below 0.10 it could re-enter the model.

Heckman (1979) uses the estimated a selection equation for the exporting intensity, and then includes that variable in the exporting intensity equation. A probit model for the firm being an

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[24] Two stage equation estimated simultaneously using the stata command Heckman

[25] Model 4 (a) covers the service sector (Industry 3-18 have been classified as services), 3,475 variables for this model; restricted as. 2,692 firms did not have labour productivity figures. Model 4(b) covers the manufacturing sector (Industry 21-29, 1729 firms). Finally, all the sectors and industries were put together plus mining and quarrying in Model 4 (c), 4685 firms restricted by labour productivity figures (3,389 firms did not have labour productivity figures. Firstly the results of the selection equation will be presented separately, though it was estimated simultaneously with the outcome equation.

exporter is used and the estimated parameters are used to calculate the inverse Mills ratio[26]. This is included as an additional explanatory variable in the OLS outcome equation estimation. The model takes into account the factors that select (change the propensity to export) into exporting and the factors that determine the outcome (changes the exporting intensity of the firm) equation. A model specification error may occur in the selection equation if relevant variables are omitted from the model, or when one or more irrelevant variables are included in the model, and to detect this error the linktest is used to find any additional independent variables that are significant except by chance. The linktest creates a variable of the squared prediction the squared predictions should not have much explanatory power. This test was used on the selection equation. The model is estimated simultaneously, but the results will be presented separately to prevent confusion.

The selection equation

$$P_i = Z_i\alpha + v_i \sim N\ (0,1) \tag{6.1}$$

Z_i is the set of variables (section 6.2) that are thought to determine the firm's propensity to export and this model is tested with the linktest command in stata which helps identify potential specification error in the model.[27]

The outcome equation

$$y_i = \mathbf{x}_i\beta + u_{1i}\ \ u_1 \sim N(0,\sigma\ ) \tag{6.2}$$

$X_{i\ is}$ the set of variables (section 6.2) that are thought to determine the firm's propensity to export.

The outcome equation uses the variables thought to effect exporting intensity and additionally there is a test on whether using the Heckman solution was necessary by using the test of

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[26] The inverse Mills' ratio (IMR) is the ratio of the probability density function to the cumulative distribution function of a distribution The Stata Heckman command in the second-stage regression uses $\lambda = \varphi\ /\ \Phi$
φ = normal density Φ = cumulative normal distribution

[27] A model specification error may occur in the probit if relevant variables are omitted from the model, or when one or more irrelevant variables are included in the model, substantially affecting the estimated coefficients of regression. As explained in the Stata manual "The idea behind the linktest is that if the model is properly specified, one should not be able to find any additional predictors that are statistically significant except by chance." The linktest works by creating after the probit regression command a variable of the linear predicted value and the linear predicted value^2, and then the model is refit using these two variables as predictors. The variable of squared prediction should not be significant if the model is specified correctly and at p values greater than 0.15, omitted variables in the model (specification error) can be rejected at the 15% level of significance.

independent equations. The test of independent equations is passed if it rejects the hypothesis of no correlation between the two error terms from the export propensity (selection) and the export intensity (outcome) equations and hence that the Heckman selection model is preferred.[28]

The observed export intensity (y_i) is zero if the firm is not an exporter and takes a positive value if it is an exporter which occurs when $Z_i\alpha + v_i > 0$.

$$
\begin{aligned}
E[y_i|x_i, p = 1] \quad &= E[y_i|x_i\, Z_i\alpha + v_i > 0] \\
&= x_i\beta + E[u_i|v_i > -Z_i\alpha] \\
&= x_i\beta + (\rho\sigma)[\varphi(Z_i\alpha)/\Phi(Z_i\alpha)] \\
&= x_i\beta + (\rho\sigma)\lambda
\end{aligned}
$$

ρ = the correlation between the error terms u_i and v_i
φ = normal density Φ = cumulative normal distribution λ = Inverse Mill's ratio

6.9. Heckman exclusion restriction

In the absence of exclusion restrictions the Heckman approach could seriously inflate standard errors due to collinearity between the correction term and the included regressors "The lack of exclusion restrictions is one likely reason for collinearity problems." Puhani (2000). To counteract this are exclusion restrictions, variables that affect the selection process (into exporting) but not the outcome equation (of exporting intensity) interest. Models with exclusion restrictions are superior to models without exclusion restrictions because they lend themselves to a more explicitly causal approach to the problem of selection bias. They also reduce the problematic correlation introduced by Heckman's correction factor. Here the exclusion restriction is that foreign subcontracting is not significant in determining intensity, but is significant in the selection equation as is labour productivity, except for manufacturing firms. For manufacturing firms the only exclusion restriction is foreign subcontracting.

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[28] Testing the null that the coefficient on λ_i is zero is equivalent to testing for sample selectivity. The coefficient of this additional variable is a function of the correlation between the two disturbances of the Model; therefore if significant, it indicates the existence of the sample selection problem and the direction of this correlation.

6.10. Results

Table 6.9: Model 4 data – Heckman selection equation: What determines export status

Dependent variable : Firms export status	Services- Model (a)		Manufacturing Model (b)		All sectors- Model (c)	
Variables	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Distance from border						
Medium distance from border	0.048**	2.21	0.082***	2.81	0.073***	3.32
Far from border	0.035	1.45	0.042	1.34	0.067***	2.78
No land border	-0.081***	-2.83	-0.061	-1.41	-0.062**	-2.44
Innovation						
Process innovation new for sector	0.050**	2.19	0.061**	2.17	0.040*	1.88
Process innovation new for enterprise	0.092***	3.01	n/s		n/s	
Product innovation themselves	0.076***	3.71	0.059**	2.29	0.078***	4.07
Foreign Technological co-operation	0.089***	3.63	0.085***	2.75	0.108***	4.63
Subcontracting						
Foreign subcontractor	0.105***	3.72	0.102***	2.82	0.122***	4.48
E-commerce ability						
No website	-0.127***	-6.6	-0.152***	-2.9	-0.127***	-5.88
Full e-commerce	0.081***	2.63	n/s		0.099***	3.31
Orders online	-0.037***	-1.81	n/s		-0.036*	-1.72
Only online	n/s		0.231**	2.43	0.191*	1.75
General information	n/s		-0.065*	-1.67	n/s	
Other forms	n/s		0.130	1.34	n/s	
Public sector support						
Subsidy	0.251***	3.48	0.109**	2.08	0.250***	4.66
Information	(A)		0.135*	1.89	n/s	
Labour productivity and employment						
Natural log of labour productivity	0.024***	3.36	n/s		0.022***	2.93
Log of employment	n/s		0.059***	5.99	0.029***	4.31
Regions/ Domestic market						
Romania & Bulgaria	-0.158***	-6.89	-0.157***	-2.76	-0.156***	-5.12
Nordic countries	-0.046*	-1.89	n/s		n/s	
UK	0.064	1.4	n/s		n/s	
France	n/s		-0.071	-1.3	n/s	
Germany	-0.071**	-2.29	n/s		-0.064*	-1.82
Italy	n/s		0.154***	4.1	0.058*	1.76
Partners and Activity abroad						
Enterprise invested abroad	0.113***	2.72	0.195***	4.44	0.164***	4.77
Domestic partner	n/s		n/s		-0.030	-1.47
EU partner	0.114***	3.77	0.111***	3.01	0.137***	4.61
Office to acquire inputs	0.269	1.41	-0.164	-1.28	0.245	1.38
Sales office	0.112	1.57	n/s		n/s	
Industry/service sector						
Other business activities	0.352***	6.79	-----		0.399***	
R&D	0.347***	4.65	-----		0.404***	6.94
Computer activities	0.333***	5.4	-----		0.387***	7.65
Human health activities	0.180***	2.58	-----		0.213****	3.07
Veterinary activities	0.332***	3.54	-----		0.375***	4.96
Other service activities	0.340***	5.78	-----		0.373***	7.44
Sale and repair of vehicles	0.358***	6.18	-----		0.384***	7.89
Wholesale trade	0.401***	7.81	-----		0.429***	10.23
Retail trade	0.208***	4.17	-----		0.248***	4.93

Dependent variable : Firms export status	Services- Model (a)		Manufacturing Model (b)		All sectors- Model (c)	
Variables	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Industry/service sector (cont.)						
Construction	0.146***	2.83	-----		0.184***	3.37
Electricity, gas,	0.199**	2.3	-----		0.209***	2.44
Transport	0.298***	5.16	-----		0.328***	6.3
Renting mach	0.314***	4.32	-----		0.345***	5.5
Legal	0.252***	4.29	-----		0.286***	5.16
Textiles	-----		(B)		0.540***	16.89
Misc. manuf.	-----		(B)		0.551*	18.11
Motor vehicles	-----		(B)		0.525***	14.06
Machinery	-----		0.071*	1.87	0.586***	24.66
Metal industry	-----		0.078**	2.3	0.585***	24.74
Coke products	-----		(B)		0.554***	18.32
Food products	-----		(B)		0.506***	13.97
Wood	-----		(B)		0.539***	16.89
Publishing	-----		-0.059	-1.39	0.516***	14.44
Mining and quarrying	-----		-----		0.459***	9.26
Imports						
Imports directly from foreign supplier	0.329***	18.03	0.317***	11.78	0.350***	21.1
$\hat{p}$	.251		.695		.378	
Pseudo R2	0.28		0.25		0.33	
Numbers	3540		1771		4787	
Linktest	0.546		0.433		0.154	

n/s = Included in Model but not significant   ----- = not included in Model   ***/**/* denotes significances at 1% level,
5% level and 10% level

Firstly, table 6.9 shows that the models pass the diagnostic link test at the level of significance of 0.546 for Model (a), 0.433 for Model (b) and Model (c) is the not significant at the 15% level. It was important to separate the models by their sectors (services etc.) as there are many differences in the variables that were significant across the different models.

The largest positive estimated effects are from 'Imports from abroad', which have a 32.9% increase in propensity for model (a), a 31.7% increase for model (b) and a 35.0% increase for model (c) ; as previously mentioned 'imports from abroad' may improve the product or service, also there maybe spill over benefits from having better contacts with abroad. Other large positive effects include taking part in 'subsidies' lead to an increase of 25.0% within model (c), also within model (c) 'investment abroad' leads to an increase in the probability of exporting by 16.4% , and 'foreign subcontracting' a 12.2% increase. 'Subsidy' was expected to have a positive effect to help with the costs of exporting, this reduction in costs should lead to the firm being able to move past some barriers on the cost issue and help them export, for example, if as is hypothesized in many models based on Melitz (2003). Melitz's 2003 theory

suggests that firms with lower costs will export, subsidies will temporarily reduce fixed costs, potentially allowing firms to make a push into being exporters; other studies that predict that subsidies will have a positive effect include Helmers and Trofimenko (2009) who find positive results of export subsidies using firm level data for Colombia. 'Investing outside the country' and having a 'partner outside the country in the EU/EEA' increased the propensity to export in each model which could be due to the firms having much better links outside the country and therefore increasing it's ability to network and export. Subsidy had only a 10.9% increase in the propensity to export for manufacturing firms in model (b), additionally and not significant in the other models, for manufacturers, 'information to help' export was significant, increasing the propensity to export by 13.5%.

The results in table 6.9 also show the many differences between manufacturing and services, with 'labour productivity' significant for services and across all sectors, while employment is significant for manufacturing and across all sectors. 'Labour productivity' is significantly positive with a 2.4% increase for model (a) and a 2.2% increase for model (c); this supports the hypothesis that higher labour productivity should help firms overcome some of the costs of exporting, thereby making it possible for firms to choose to export. Another predicted effect is the positive effect of greater levels of employment as in model (b), employment is significant with a 5.9% increase, also in model (c) where employment is significant with a 2.9% increase in the propensity to export.

The largest negative significant effect for model (c) is 'no-ecommerce' with -12.7% , this and the other effects of e-commerce are as expected with' full e-commerce compatibility' bringing a 9.9% increase, these effects are presumably due improving links with other firms, clients and suppliers. For example, Leonidou et al. (2007) explains that unsolicited orders can be a good way for firms to attract new business from foreign firms via the internet. 'Orders online' is slightly negative for services at -3.6% for model (c) and -3.7% for model (a); suggesting that the ways that are typically used to find goods in manufacturing are different than services and do not rely on using the internet as much as they do for the service industry. 'Orders online' might only improve exporting propensity in conjunction with other parts of e-commerce, such as using an 'online catalogue'; as in Ganotakis and Love (2011) where they suggest that the use of e-commerce does not boost entry into export. Another large negative effect is for firms who have 'no land border' with a -6.2% effect for Model (c); this result is in line with theories,

such as Disdier and Head (2008) and Blum and Goldfarb (2006) that the distance between two countries has a negative effect on the propensity to export.

Economic theory on innovation effects on exporting in the UK, such as tested in Harris and Li (2009, 2010), and Harris and Moffat (2011), predicted that product innovation and process innovation would improve the products or processes meaning that the firm's would find it easier to compete in international markets. For model (c), 'product innovation in-house' has a 7.8% increase in propensity to export, while 'process innovation new for sector' has a 4.0% increase and 'foreign technological co-operation' has a 10.8% increase. This innovation and co-operation presumably leads to cheaper or improved products/services giving the firm a competitive advantage, improving a firm's ability to compete internationally. Product innovation was only significant for manufacturing firms if done 'in-house', suggesting that this shows a higher level of absorptive capacity.

The results in table 6.9 also indicate different domestic markets effects, as predicted in different studies, such as Albornoz et al. (2009) and Greenaway and Kneller (2004) who find entry to an export market is strongly related to export experience within the same region. 'Romania and Bulgaria' has a-15.6% propensity to export for model (c) and 'Germany' has a - 6.4% effect. Positive region effects include 'Italy who have a 14.3% increase in propensity to export for model (b) and 'the UK' who have a 6.4% propensity increase for model (a). These results show that there might be differences in culture, ways of doing business or perhaps laws and institutions that change the propensity to export for different regions. The differences in domestic market significance between services and manufacturing might be due to the difference in infrastructure, such as better links for manufacturing due to the potential of more specialised infrastructure being needed, for example if the manufacturing is heavy.

Table 6.10: Model 4 - Heckman outcome equation: What effects exporting intensity

Dependent variable: log of exporting intensity	Services 4(a)		Manufacturing 4(b)		All sectors 4(c)	
Variables	Coefficient	z-value	Coefficient	z-value	Coefficient	z-value
Age						
Oldest created firm	-0.173**	-2.24	n/s		n/s	
Distance from border						
Close to border	n/s		n/s		0.237***	3.65
No land border	-0.313***	-2.73	-0.405***	-3.55	n/s	
Medium distance from border	-0.255***	-2.8	-0.178**	-2.44	n/s	
Far from border	-0.242**	-2.39	n/s		n/s	
Subcontracting						
Subcontractor to a main contractor	0.382***	4.29	0.241***	2.79	0.333***	4.86
Innovation						
Product innovation new for sector	-0.132*	-1.64	n/s		n/s	
Process innovation new for enterprise	-0.132	-1.36	n/s		n/s	
Technological co-operation	0.171*	1.99	0.108	1.43	0.128**	2.08
E-commerce ability						
Other forms	n/s		0.688*	1.93	n/s	
Took orders online	n/s		-0.222***	-2.96	-0.166***	-2.71
Had an online catalogue	-0.175**	-2.45	n/s		-0.122*	-1.91
General information	n/s		0.157	1.61	0.162*	1.93
No web	n/s		-0.406***	-3.55	0.249**	2.27
Public sector support						
Subsidy	n/s		0.229*	1.89	0.232**	2.18
Information	n/s		-0.254	-1.46	n/s	
Employment						
Employment	n/s		0.055*	1.87	n/s	
Regions/domestic market						
Log of GDP 2006	-0.085***	-3.72	-0.125***	-6.1	-0.131***	-6.09
Poland	-0.425***	-2.78	-0.379***	-2.75	-0.480***	-4.07
France	n/s		-0.286*	-1.84	-0.444	-1.62
Spain	n/s		n/s		-0.277***	-2.54
Remaining countries	n/s		n/s		-0.1948**	-2.62
Nordic countries	-0.222**	-2.07	-0.255**	-2.21	-0.433***	-4.75
UK	n/s		n/s		-0.192	-1.6
Partners and Activity abroad						
Own country partner	-0.325***	-4.1	-0.108	-1.34	n/s	
EU or EEA partner	n/s		0.210**	2.2	0.126*	1.74
Outside the EU partner	0.351***	2.83	n/s		n/s	
Sales office	0.275	1.64	0.853	1.35	0.595	1.57
Industry/sector						
Miscell. Manuf.	-----		0.219	1.62	0.259*	1.77
Motor vehicles	-----		0.356**	2.36	0.386**	2.44
Machinery	-----		0.272**	2.13	0.210*	1.75
Metal industry	-----		0.394***	3.16	0.475***	3.98
Publishing	-----		-0.308**	-2.05	-0.313**	-2.07
Coke & chemicals	-----		0.320**	2.45	0.374***	2.92
Wood products	-----		0.337**	2.42	0.358**	2.49
Textiles	-----		0.573***	4.26	0.494***	3.61

Variables	Services 4(a)		Manufacturing 4(b)		All sectors 4(c)	
	Coefficient	z-value	Coefficient	z-value	Coefficient	z-value
Industry (cont.)						
Other service activities	-0.307**	-2.08	-----		-0.297***	-2.06
Computer and related	-0.231*	-1.63	-----		-0.223	-1.62
Transport	0.712***	5.08	-----		0.721***	5.25
Legal & Accounting	(A)		-----		-0.226	-1.42
Retail trade	-0.228**	-2.02	-----		-0.260**	-2.38
Wholesale trade	-0.224*	-2.08	-----		-0.170*	-1.69
Sale maintenance of	-0.294*	-2.07	-----		-0.267**	-1.97
Electricity, gas, water	-0.543*	-1.93	-----		-0.585**	-2.1
Mining and quarrying	-----		-----		0.415**	2.3
Export destination						
Australia/New Zealand	0.392**	2.4	n/s		0.157	1.42
North America	0.450***	4.03	0.360***	3.69	0.384***	4.73
China	n/s		0.404***	3.34	0.280***	2.74
Japan	0.233	1.42	0.311**	2.4	0.272***	2.43
Other Africa	0.256**	1.97	n/s		0.230**	2.49
North Africa	0.210*	1.63	0.212**	1.98	0.185**	2.02
Other European countries	0.312***	3.83	0.258***	3.4	0.278**	4.7
Russia	0.372***	3.6	0.237***	2.61	0.346***	4.68
Other European Union (EU-27) or EEA	0.454***	5.42	0.488***	5.43	0.463***	6.93
Brazil	-0.314*	-1.74	0.249*	1.8	n/s	
Other Asia	0.324**	2.32	n/s		n/s	
Cross border regions	n/s		0.147**	2.15	0.087	1.6
Imports			0.127*	1.84		
Middle East	-0.266*	-1.92	n/s		n/s	
Other European countries	0.145	1.44	n/s		n/s	
Other south and central America	n/s		n/s		0.204	1.33
Other Africa	-0.336	-1.48	n/s		-0.269	-1.62
Russia	-0.313*	-1.8	n/s		-0.197	-1.62
Other European Union (EU-27) or EEA	-0.345***	-3.55	-0.130	-1.56	-0.202***	-2.86
North America	n/s		-0.288	-1.33	-0.099	-1.37
Number of obs	3475		1771		4787	
Censored obs	2444		627		2820	
Uncensored obs	1096		1144		1967	
χ^2	Wald χ^2 (37) = 466.19		Wald χ^2 (34) = 422.55		Wald χ^2 (49) = 765.73	
Log likelihood	-3246.325		-2564.902		-5177.538	
The test of independent equations χ^2 (1) =	12.48 Prob > χ^2 = 0.0004		1 Prob > χ^2 = 0.3168		5.24 Prob > χ^2 = 0.0221	

n/s = Included in Model but not significant   ----- = not included in Model   ***/**/* denotes significances at 1% level, 5% level and 10% level

Table 6.10 shows the outcome equation results of the Heckman model (estimated simultaneously with the selection equation in table 6.7); the estimated relationship of the variables to exporting intensity. Across the models the diagnostic tests provided in the lower part of the table also show that the Heckman selection procedure is clearly justified for model (a) and model (c), since between the error terms of the two equations in the model is

statistically significantly different from zero (rejecting the null hypothesis at better than the 1% significance level for model 4 (a), and at better than the 3% significance level for model 4 (c); however model 4 (b) is not justified in using the Heckman selection.

The variables that had the largest positive effect on exporting intensity include 'close to the border' with a 23.7% increase for model (c), though it is not significant in the other models; the other distance form border variables show a negative effect on intensity, such as model (a) which shows a -31.3% effect with no land border and -40.5% in model (b). Distance from the border seems to works as hypothesised, that exporting intensity is significantly positive for firms closer to the border and negative for firms that are further from the border or have 'no land border'. Other variables that had large positive effects includes subsidy which has a 23.2% increase for model (c) and a 22.9% increase for model (b); 12.6% for 'partner within the EU' for model (c) and 'subcontracting' 33.3% for model (c). As expected 'subsidy' has a positive effect, as subsidies should help with the fixed cost of exporting, and there is a 23.2% increase for model (c) though it is not significant for service firms. 'Being a subcontractor' is significant in increasing exporting intensity across every model with a 33.3% increase for model (c), this might be as subcontractors might have more links or better ways of finding new business.

'Partners and activity abroad' section of the results shows that for model (a) there is a 35.1% in exporting intensity if a firm for 'partners outside the EU' and a negative effect from having 'partners inside the domestic country' of -32.5%. Additionally model (b) and (c) show a positive effect in exporting intensity for having a 'partner inside the EU' of 21% and 12.6% respectively. The reason that partners may have effect exporting intensity is that it helps show the direction of the firms regarding where they want to sell to and which types of help they might be able to expect. Partners inside the country could increase the size of the domestic market, reducing the percentage of exports compared to total turnover and it is a sign that firms will be more interested in the domestic sphere; firms that have partners outside the country have more links to allow them to export . All of the models also showed positive effects on exporting intensity of having a 'sales office abroad', though it was not strongly significant, this matches the strong expectation that sales offices allow firms to sell good/services and make more contacts for sales.

The log of GDP, which is the proxy for size of the domestic market, has a negative relationship (-13.1% for model (c) to exporting intensity, this means that the larger the domestic market the smaller the exporting intensity; this met expectations as the firms would have more incentive to export and also less of a home market to decrease the ratio of exporting to turnover. In terms of industry effects, many service industries are negative for exporting intensity with for 'utilities' a -58.5% effect and 'transport' which has a 72.1% increase on exporting intensity, all from Model (c). Manufacturing industries in model (c) have several large effects, such as from 'machinery' which had a 21.0% intensity increase, 'textile' which had a '49.4% increase, and 'miscellaneous manufacturing' which had a 25.9% increase in exporting intensity. The effects of having e-commerce ability to take 'orders online' which had a -16.6% exporting intensity significant at the 1% level for model (c) or having an online catalogue' which had a -12.2% at the 5 % level of significance for model (c); the e-commerce ability mainly helps the firm to expand domestically, this increase in domestic market means that exporting as a percentage of total turnover decreases. This also makes sense for explaining no e-commerce having a 26.4% increase in exporting intensity for model (c). 'General information' positively increased exporting intensity as hypothesised with a 16.2% increases at the 5% level of significance for model (c).

Finally, for model (c), exporting to 'other parts of the EU' had a 46.3% increase in exporting intensity, which is the largest positive effect on exporting intensity. Amongst the other significant exporting destinations that are significant at the 1% level are 'Russia', which has a 35.4% increase in exporting intensity, and 'other European countries not in the EU', which has an 8.1% increase in exporting intensity. As the largest effects are from areas which are commonly thought of as being more developed, perhaps these areas are more integrated into the global economy and these areas are easier to export to. Perhaps the most interesting point is the difference between labour productivity in the selection and the outcome equations, labour productivity was found to not affect exporting intensity, but it was important in selection to export.

6.11 Model 5 - Tobit - Exporting Experience

To extend the model it was decided to the relationship to the variables to experience[29] using a Tobit model. The purpose of the Tobit will be to determine given that the firm is still exporting in 2006-2008 what effect do different variables have on the percentage of exporting experience the firm has had.

The Tobit model[30] is a special case of a censored regression Model, because the latent variable y_i^* cannot always be observed while the independent variable x_i is observable.

$$y_i = X_i\beta + E \qquad \in \sim N(0, \sigma^2) \tag{6.3}$$

$$y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases}$$

Where y_i^* is if the firm has as an exporting experience.

The probability is obtained as follows:

$$P[y_i = 0 \mid x_i] = 1 - \Phi(x_i'\beta)$$

The Tobit censored any variables that had 0 exporting experience. The sample is also reduced as not all firms gave the correct variables to allow exporting experience to be calculated. For this reason there are fewer observations than for Models 4(a, b, c). 1,045 uncensored firms were used for services, restricted from the full size of services firms as labour productivity was significant (2,716 firms did not have labour productivity figures). 1,073 uncensored firms were used for manufacturing; here labour productivity was not significant. 1,835 uncensored firms were used for all sectors (services, manufacturing and mining), restricted from the full sample as labour productivity was significant. (3,371 firms did not have labour productivity figures).

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[29] Exporting experience was measured as time spent exporting divided by time firm existed.
[30] The tobit command in stata was used

6.12.   Model 5 – Tobit Results

Table 6.11 : Model 5 Tobit Results

Dependent variable: Exporting experience	Services - Model 5(a)		Manufacturing Model 5(b)		All sectors - Model 5(c)	
Variables	Coef.	t-Values	Coef.	t-Values	Coef.	t-Values
Age of firm						
Oldest age	-0.071**	-2.22	-0.118***	-4.35	-0.102***	-4.44
Distance from border						
Far from border	0.081**	2.01	n/s		0.065**	2.27
Medium distance	0.086**	2.28	0.048*	1.7	n/s	
Close to border	n/s		n/s		0.084**	3.16
No land border	-0.140**	-2.41	-0.129***	-3.2	-0.139***	-3.19
Innovation						
Product innovation themselves	0.113***	3.44	0.069***	2.65	0.068***	2.95
Process innovation	0.100**	2.29	n/s		0.058*	1.88
Technological co-operation	0.146***	3.89	0.069**	2.24	0.112***	4.27
Subcontracting						
Foreign subcontractor	0.159***	3.83	0.112***	3.22	0.144***	4.81
Subcontractor to a main	0.213***	4.81	0.106***	2.94	0.150***	4.74
E-commerce						
Other forms	-0.523***	-2.58	n/s		-0.200*	-1.65
Orders online	-0.083**	-2.29	n/s		-0.037	-1.42
Fully e-commerce	0.161***	3.41	n/s		0.117***	3.39
No-ecommerce	-0.274***	-6.31	-0.135***	-3.71	-0.196***	-6.28
Public sector support						
Subsidy to export	0.261***	3.18	n/s		0.167***	3.35
Information to export	-----		0.127*	1.71	-----	
Labour productivity						
Natural log of labour productivity	0.053***	4.13	n/s		0.038***	4.01
Log of employment	n/s		0.052***	5.1	0.024***	2.78
Regions/Domestic market						
Romania & Bulgaria	-0.329***	-4.7	-0.162***	-3.15	-0.235***	-4.93
Poland	n/s		-0.170***	-3.13		
Germany	0.140**	-2.16	n/s		-0.116**	-2.48
Italy	n/s		0.160***	3.06	0.075*	1.85
UK	0.196***	2.71	n/s		0.134**	2.51
Activity abroad						
Enterprise invested abroad	0.155***	3.28	0.113***	2.71	0.118***	3.44
Own country partner	-0.056	-1.59	n/s		-0.058**	-2.32
Countries outside the EU / EEA	0.106**	2.25	n/s		0.084**	2.49
Sales office	0.310	1.42	n/s		0.308*	
Industry/sector						
Construction	-0.376***	-6.99	-----		-0.546***	
Electricity gas	-0.267**	-2.39	-----		-0.451***	
Sale and repair of motor vehicles	-----		-----		-0.168***	
Other business activities	-----		-----		-0.491***	
Transport	-----		-----		-0.713***	
Veterinary activities	-----		-----		-0.241***	
Human health activities	-0.319***	-3.76	-----		-0.214**	
Renting of machinery	n/s		-----		-0.231***	-4.18
Transport	-----		-----		-0.713***	-7.22

Variables	Services - Model 5(a)		Manufacturing - Model 5(b)		All sectors - Model 5(c)	
	Coef.	t-values	Coef.	t-Values	Coef.	t-Values
Industry(cont.)						
Veterinary activities	-----		-----		-0.241***	-4.34
Real estate activities	-0.558***	-4.9	-----		-0.269***	-3.6
Wholesale trade	n/s		-----		-0.150	-3.62
Hotels catering	-0.482***	-5.97	-----		-0.180***	-3.69
Retail trade	-0.224***	-5.25	-----		-----	
computer	-0.083	-1.33	-----		-0.340***	-6.27
Legal	-0.161***	-2.63	-----		-0.183***	-4.32
Machinery	-----		0.059	1.53	0.112**	2.11
Metal industry	-----		0.073**	2.02	0.103**	2.03
Publishing	-----		-0.135**	-3.09	-----	
Imports from						
Imports directly from foreign supplier	0.529***	13.92	0.285***	5.83	0.463***	18.3
Other European Union	-----		0.096**	2.14	-----	
North Africa	-----		-0.170**	-1.85	-----	
Cross border regions	0.075**	1.94	(B)		-----	
Russia	-----		0.152**	2.49	-----	
Other European countries	0.082*	1.76	(B)		0.080**	2.51
India	0.105	1.57	0.121**	2.31	0.103**	2.26
Other Asia	0.153***	2.81	0.104**	2.25	0.120***	3.1
Number of obs	3496		1718		4667	
LR χ^2	LR χ^2 (36)=1261.49		LR χ^2 (23) = 583.51		LR χ^2 (45) = 2036.85	
Log likelihood	-1889.4979		-1171.2916		-2797.2134	
Pseudo R^2	0.2503		0.1994		0.2698	
Censored observations	2451		645		2832	
Uncensored observations	1045		1073		1835	

n/s = Included in Model but not significant   ----- = not included in Model   ***/**/* denotes significances at 1% level, 5% level and 10% level

6.13. Analysis of results

Table 6.11 shows the results of the Tobit models of which the largest positive estimated effects are 'imports directly from foreign supplier' with a 46.3% increase in exporting experience for model (c). 'Being a subcontractor' and having a 'foreign subcontractor' increased exporting experience across every model, 'being a subcontractor' increasing exporting experience 15% for model (c) and 'having a foreign subcontractor' led to a 14.4% increase for model (c).

Many of the results are similar to the results of the selection equation for model 4, as the variables are determining what increases the likelihood of a firm exporting. For example, 'subsidy' was associate with greater levels of exporting experience 26.1% for model (a) and

16.7% for model (c), but was not significant for model (b); the selection equation in model 1 had the same result that subsidies for manufacturing firms did not have a significant change in firm's ability to export. The reasoning for this maybe that there are different costs associated with exporting for manufacturers and the subsidies do not have sufficient effect to ameliorate and absorb these costs.

Results on distance from the border show that having 'no land border' has a negative across all the models with a -13.9% relationship on exporting experience for model (c); though strangely 'far from border' in model (c) also has positive effects of 6.5% which could be potentially due to agglomeration effects if being 'far from the border' is also closer to large cities and capitals. Existing for twenty five years had relationship of -10.5% in exporting experience for model (c), presumably as older firms may have belonged to periods of time when there was less "globalisation" meaning that exporting was less of an option for firms.

'Product innovation conducted in-house' was significant for services in model (a) with a 11.3% association; manufacturing in model (b) with a 6.9% association and for the combined sectors in model (c) a 6.8% association, this should be due to the firm becoming more competitive through better products/services that allow the firms to compete more easily internationally. Additionally 'foreign technological co-operation' was associated with 11.2% more exporting experience.

Being 'fully e-commerce compatible' is associate with 11.7% higher levels of exporting experience in model (c); e-commerce is an extra way for firms to make contact with clients, though this does not explain the negative effect of 'other forms of e-commerce' in model (c).

The results of model 4 selection equation repeat themselves as 'labour productivity' is significant for service firms and employment is significant for manufacturing firms. 'Labour productivity' is associate with higher levels of exporting experience, such as 5.3% for service firms and for firms from all sectors in model (c) there is a relationship of 3.8%. 'Employment' is associated with increased exporting experience for manufacturers (5.2%) and for all sectors in model (c) of 2.9% , this maybe as the firm could have better economies of scale or scope or more capacity to help with the change into being an exporter.

'Imports from different countries' are significant across all the models with a 46.3% increase in exporting experience for model (c); possibly with these firms showing linkages with different parts of the world that increase the firms networking ability and links with these parts of the world. Alternatively importing from particular regions might suggest that a firm is taking place in a particular type of trade that makes it more likely to be an exporter. For example, importing from a more developed country suggests that more refined and developed goods are being bought, rather than buying from other regions that might be supplying perhaps more limited developed goods. Of the imports from particular regions, most effects were positive with imports from 'India' associated with 10.3% higher level of exporting experience for model (c); 'Other Asia' as an import source was associated with 12.0% higher levels of exporting experience for model (c); and 'Other European countries' as an importing source had an 8% higher level of exporting experience suggesting that these areas had strong positive spill over effects. Interestingly the one negative source of imports found significant was 'North Africa, for model (b); perhaps the inputs sourced from these areas are not of sufficient quality to improve the outputs of the manufacturers.

6.14 Policy implications

The results show that higher levels of exporting experience are more likely in firms that have higher levels of labour productivity. However, there are clearly some barriers to these firms in the form of negative relationships between exporting experience and other variables. This includes no- e-commerce, which has a negative relationship with exporting experience. Using e-commerce is correlated with higher levels of exporting experience, which could imply that firms that do not have e-commerce lose a chance to export. This could be improved by government programs to improve e-commerce. Another key variable is older firms which have a negative relationship to exporting.

Other firms that would be likely candidates to be exporters, but other characteristics inhibit them. For example, for firms that have undertaken innovation, the innovation may make the firm more likely to export, however of these, the firms with a larger number of employees may be associated with exporting more than those firms with a relatively low level of employees. So picking smaller firms who have already undertaken innovation as candidates for subsidy may be useful as otherwise despite having some of the beneficial associations with being an exporter, such as innovation, they will not export.

6.15 Model 6 Exporting age- Ordinal probit, Multinomial logit and selectively constrained Models

Previously, Model 4 examined what effect variables would have in changing the propensity to export and intensity, while Model 5 examined exporting experience. One potential way that these models fails to pick up the effects of exporting experience is that firms that have existed for different lengths of time are treated the same, so that 5 years of exporting experience for a firm that has existed for 5 years is treated the same as a firm that has existed and exported for 10 years. To understand the differences that affects the next model measures the differences variables have on the propensity to export, given that the firms have been exporting for different lengths of time. To gain further information it was decided to examine what the effect the variables would have on firms who have been exporting for different lengths of time; for firms who have been exporting for longer periods of time what difference do the variables have. Firms that have been exporting for longer have presumably gone past some barriers of exporting due to incremental knowledge gained from exporting; the importance of this is that there maybe barriers that firms need to overcome to export, but if they have experience then the effect of these variables might be different than the variables that helps maintain firms as exporters.

Firms gave information on how long they had been exporting if they were an exporter in 2006-2008 and from this the dependent variable is how long the firms have been exporting for five different time periods. Different methods are used with an ordered probit[31], a multinomial logit [32]and a selectively parallel line constrained model[33]. This means that the results will show the probability of being an exporter, given that the firms have already been exporting for those periods of exporting time.

The ordinal model assumes ranking of the effects of exporting and because of this assumes fewer parameters; but this simplicity is achieved by imposing constraints that potentially distort the process being modelled. In contrast the multinomial logit has the most parameters to calculate and is more appropriate if the effects are not thought to be ordinal. Another alternative is a model that is selectively constrained on different variables, this type of model

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[31] The stata command oprobit was used in. Table 6.12, Table 6.15, Table 6.18
[32] The stata command mlogit was used in. Table 6.13, Table 6.16, Table 6.19
[33] The stata command gologit2 was used in. Table 6.14, Table 6.17, Table 6.20

is more experimental in the sense that it is not often used in academic papers, it is a compromise between a ordered probit where all variables are put against the parallel line constraint and the multinomial logit which frees all the variables from the parallel lines constraint. The 'gologit2' model selectively constrains variables based on estimating partial proportional odds models, where the parallel lines constraint is only relaxed for those variables where it is not justified.

One of the main differences between these models is that the multinomial logits make the independence of irrelevant alternatives assumption (IIA). The IIA means that adding or deleting alternatives does not affect the odds among the remaining alternatives as opposed to for ordered probits who do not assume IIA, and is more appropriate when there is a strong belief that there is an ordered effect on the dependent variable (spent less time exporting to more time exporting).

The multinomial logit frees all variables from the parallel lines constraint, even though the assumption may only be violated by one or a few of them. By applying the stata command gologit2 it can be decided which variables need the assumption and which variable do not as a Brant test is applied within the program to determine which variable at the 5% level are significant. This is done by estimating a totally unconstrained model and then applies Wald tests on each variable individually to see whether the coefficients differ across equations and that the variable meets the parallel lines assumption. If the Wald test is statistically insignificant for one or more variables, the variable with the least significant value on the Wald test is constrained to have equal effects across equations and is repeated until the final model does not violate the parallel lines assumption. Gologit2 can estimate models that are less restrictive than the parallel lines models estimated by an ordinal probit but more parsimonious and interpretable than those estimated by multinomial logistic regression.

This meant creating five similar sized bands as below.

$$y_i^* = \beta' x_i + \varepsilon_i \tag{6.4}$$

Where

$$y_i = \begin{cases} 0 \ if \ -\infty < y^*_i < \mu_1 \ (firm \ was \ not \ exporting \ between \ 2006 - 2008) \\ 1 \ if \ \mu_1 < y^*_i < \mu_2 \ (firm \ started \ exporting \ between \ 2005 - 2008) \\ 2 \ if \ \mu_2 < y^*_i < \mu_3 \ (firm \ started \ exporting \ between \ 1999 - 2004) \\ 3 \ if \ \mu_3 < y^*_i < \mu_4 \ (firm \ started \ exporting \ between \ 1994 - 1998) \\ 4 \ if \ \mu_4 < y^*_i < \mu_5 \ (firm \ started \ exporting \ between \ 1985 - 1993) \\ 5 \ if \ \mu_5 < y^*_i < \infty \ (firm \ started \ exporting \ before \ 1985) \end{cases}$$

The thresholds μ indicate an array of the normal distribution related to definite values of the explanatory variables.

The probability is obtained as follows:

$\Pr(y_i = 0 \mid x) = 1 - \Phi[\beta' x_i - \mu_1]$

$\Pr(y_i = 1 \mid x) = 1 - \Phi[\beta' x_i - \mu_1] - \Phi[\beta' x_i - \mu_2]$

$\Pr(y_i = 2 \mid x) = 1 - \Phi[\beta' x_i - \mu_2] - \Phi[\beta' x_i - \mu_3]$

$\Pr(y_i = 3 \mid x) = 1 - \Phi[\beta' x_i - \mu_3] - \Phi[\beta' x_i - \mu_4]$

$\Pr(y_i = 4 \mid x) = 1 - \Phi[\beta' x_i - \mu_4] - \Phi[\beta' x_i - \mu_5]$

$\Pr(y_i = 5 \mid x) = 1 - \Phi[\beta' x_i - \mu_5]$

Multinomial logit models are generalization of logit models for binary responses; it is analogous to a logistic regression model, except that the probability distribution of the response is multinomial instead of binomial and fitting the generalized logit model requires simultaneously satisfying the $J - 1$ equations that specify the model instead of one.

A multinomial logit model is defined as follows

$$\log\left(\frac{\Pr_{ij}}{\Pr_{i1}}\right) = x\beta_j \quad for \ j = 2,\ldots,J, \ i = 1,\ldots,N, \tag{6.5}$$

The probability is obtained as follows:

$$P_i\,(Y=1) = \frac{1}{1+ \sum\limits_{j=1}^{J} \exp\{x\beta_j\}}$$

$$P_i\,(Y=j) = \frac{\exp\{x\beta_j\}}{1+ \sum\limits_{j=1}^{J} \exp\{x\beta_j\}}$$

$$P_i\,(Y=J) = \frac{\exp\{x\beta_j\}}{1+ \sum\limits_{j=1}^{J} \exp\{x\beta_j\}}$$

where $j = 2,.....,J - 1,\;\; i = 1,....,N,$

For the selectively constrained model the probability is obtained as follows as explained by Williams (2006):

Firstly the general ordinal logit is used as the basis.

$$P(Y_i > j) = g(X\beta_j) = \frac{\exp(\alpha_j + X_i\beta_j)}{1+ [(\exp(\alpha_j + X_i\beta_j)]}, j = 1,2,.....,M - 1 \tag{6.6}$$

Which then potentially becomes in the parallel lines model that the β 's but not the α 's are the same for all values of j.

$$P(Y_i > j) = g(X\beta_j) = \frac{\exp(\alpha_j + X_i\beta)}{1+ [(\exp(\alpha_j + X_i\beta)]}, j = 1,2,.....,M - 1 \tag{6.7}$$

Where M is the number of categories of the dependent variable. In the example below the parallel lines model estimates the β 's of X_3 as the same for all values of j as the model has restricted it.

$$P(Y_i > j) = \frac{\exp(\alpha_j + X_{1i}\beta_{i1} + X_{2i}\beta_{i2} + X_{3i}\beta_{3j})}{1+ [(\exp(\alpha_j + X_{1i}\beta_1 + X_{2i}\beta_2 + X_{3i}\beta_{3j})]}, j = 1,2,.....,M - 1 \tag{6.8}$$

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Models

The number of firms in each model was different in each model as some variables were not answered meaning that the observations could not be put in the model, for example, labour productivity was significant in the ordered probit in model 6(a), but not significant for the multinomial logit in model 6 (a). The number of observations for each band is given in the results below and also the total number of variables in the left hand column.

6.16 Caveat on potential selection bias

There are some weaknesses in using this survey on the period of time as information on whether the firm is an exporter, the firms do not give detailed information on stops or breakages in exporting and the comparison omits firms that no longer exist. Firms that have exported in 1985 or in the other time periods may no longer exist and these missing firms that do not exist that may have unobservable. These firms that fail are not seen and are 'censored' as there is no observation of the subsequent history of the firm, the firm will not exist in 2009 to be asked to answer a survey. Firms may have life cycles and be more likely to fail at certain points of that cycle. Therefore newer firms, that may have a particular set of attributes, have not yet had a chance to fail or fail at exporting and the variables that are associated with these firms exporting may bias the results. This is because there will be differences in the firms that have come into creation at the end of this sample.

In other words there might be a dependence on the duration of existing as a firm, dependent on the length of existence of a firm. Younger firms could be more or less likely to become bankrupt, depending on their age, than older firms. As the younger firms may have a different dependence on existing, the firms maybe more or less likely to appear in the survey. Firms that do not exist cannot answer the survey, therefore potentially biasing the type of firms that are recorded in the survey, for example the older exporters recorded still exist, information on the firms that have ceased to exist cannot obviously be provided. Potentially the difference is greater for older firms as there may have been more opportunities for firms to have gone bankrupt over a longer time period.

6.17. 6 (a) Services

Table 6.12: Model 6 (a) Services - Ordered probit

Dependent variable: Exporter	Non exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
Variables	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Distance from border												
Close to border**	0.037	2.22	-0.006	-2.14	-0.011	-2.18	-0.008	-2.21	-0.007	-2.23	-0.005	-2.25
No land border***	0.097	4.04	-0.017	-3.52	-0.029	-3.79	-0.021	-3.99	-0.017	-4.17	-0.013	-4.35
Innovation												
Product innovation themselves ***	-0.055	-3.01	0.008	3.09	0.016	3.04	0.012	2.96	0.011	2.9	0.009	2.78
Product innovation new for enterprise *	-0.034	-1.83	0.005	1.89	0.010	1.85	0.007	1.82	0.007	1.79	0.005	1.74
Technological co-operation***	-0.089	-4.42	0.013	4.72	0.024	4.54	0.019	4.27	0.018	4.06	0.015	3.77
Subcontracting												
Foreign ***	-0.129	-5.82	0.017	6.42	0.034	6.05	0.028	5.49	0.027	5.12	0.024	4.61
E-commerce ability												
No e-commerce ability***	0.110	5.72	-0.019	-4.85	-0.033	-5.29	-0.023	-5.5	-0.020	-5.68	-0.014	-5.77
Other forms*	0.135	2.41	-0.027	-1.94	-0.043	-2.21	-0.028	-2.52	-0.022	-2.84	-0.015	-3.38
Orders online**	0.045	2.53	-0.007	-2.39	-0.013	-2.46	-0.010	-2.51	-0.008	-2.55	-0.006	-2.61
Fully e-commerce compatible ***	-0.099	-3.71	0.013	4.22	0.026	3.91	0.021	3.61	0.020	3.4	0.017	3.11
Public sector support												
Subsidy***	-0.150	-3.05	0.018	4.38	0.037	3.55	0.032	3.04	0.032	2.71	0.030	2.32
Employment and labour												
Natural log of labour productivity ***	-0.031	-4.68	0.005	4.44	0.009	4.53	0.007	4.49	0.006	4.47	0.005	4.47
Log of employment***	-0.026	-4.39	0.004	4.18	0.007	4.27	0.006	4.23	0.005	4.23	0.004	4.22
Regions/Domestic market												
UK***	-0.100	-2.43	0.013	2.9	0.027	2.62	0.022	2.41	0.020	2.25	0.018	2.04
Germany**	0.055	1.87	-0.010	-1.71	-0.016	-1.8	-0.012	-1.88	-0.010	-1.96	-0.007	-2.07
Romania & Bulgaria***	0.142	6	-0.028	-4.7	-0.044	-5.36	-0.030	-5.87	-0.024	-6.36	-0.016	-6.82
Benelux***	-0.118	-3.25	0.015	4.09	0.031	3.58	0.026	3.2	0.024	2.93	0.022	2.62

Dependent variable: Exporter	Non exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
Variables	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Partners and Activity abroad												
Enterprise invested abroad ***	-0.110	-4.08	0.014	4.76	0.029	4.35	0.024	3.97	0.022	3.69	0.020	3.31
Industry												
Electricity, gas ***	0.145	3.86	-0.030	-3.04	-0.046	-3.5	-0.030	-3.97	-0.024	-4.47	-0.016	-5.17
Wholesale trade **	-0.065	-2.32	0.009	2.56	0.018	2.42	0.014	2.29	0.013	2.19	0.011	2.06
Other business activities	-0.040	-1.44	0.006	1.52	0.011	1.47	0.009	1.43	0.008	1.39	0.006	1.34
Legal, accounting**	0.062	2.13	-0.011	-1.93	-0.019	-2.04	-0.013	-2.13	-0.011	-2.23	-0.008	-2.36
Retail trade***	0.099	4.7	-0.018	-4.05	-0.030	-4.38	-0.021	-4.59	-0.017	-4.8	-0.013	-5
Real estate activities***	0.208	7.93	-0.046	-5.52	-0.068	-6.8	-0.042	-7.83	-0.032	-8.69	-0.020	-8.85
Construction***	0.143	6.76	-0.028	-5.35	-0.044	-6.04	-0.030	-6.45	-0.024	-6.85	-0.017	-7.05
Transport travel ***		-0.057	-1.74	0.008	1.91	0.016	1.81	0.012	1.72	0.011	1.65	0.009
Human health activities ***	0.099	2.95	-0.019	-2.51	-0.030	-2.76	-0.021	-2.99	-0.017	-3.22	-0.012	-3.55
Hotels ***	0.176	7.22	-0.037	-5.33	-0.056	-6.3	-0.036	-7.04	-0.028	-7.69	-0.019	-7.93
R&D	-0.062	-1.31	0.009	1.48	0.017	1.38	0.013	1.3	0.012	1.25	0.010	1.16
Imports												
Imports ***	-0.306	-18.82	0.042	11.58	0.081	13.75	0.065	12.54	0.062	12.01	0.056	10.81
	0.731	0.072	0.072	0.091	0.091	0.051	0.051	0.035	0.035		0.020	
Number of obs 3,660	2,484		216		317		224		206		213	

LR chi2(30) =   1271.51

Log likelihood = -3538.0236

Pseudo R²=   0.1523   H₀: omitted variables = 0.663

***/**/* denotes significances at 1% level, 5% level and 10% level

Table 6.13: Model 6 (a) services Multinomial logit

Dependent variable: Exporter	Non exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
Variables	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Innovation												
Product innovation	-0.105	-7.67	0.030	4.06	0.033	4.68	0.027	4.8	0.010	2.31	0.004	1.07
Technological co-operation	-0.077	-4.72	0.026	2.95	0.023	2.85	0.006	1.11	0.014	2.58	0.008	1.85
Subcontracting												
Foreign	-0.119	-6.41	0.009	1.05	0.032	3.51	0.028	3.79	0.027	3.85	0.024	3.82
E-commerce ability												
No e-commerce	0.086	7.59	-0.010	-1.54	-0.026	-4.48	-0.018	-3.97	-0.013	-3.15	-0.019	-5.34
Public sector support												
Subsidy	-0.229	-3.76	0.070	2.19	0.058	2.12	0.033	1.75	0.017	1.12	0.051	2.54
Partners and Activity abroad												
Invested abroad	-0.152	-5.87	0.023	1.91	0.045	3.52	0.033	3.32	0.014	1.85	0.037	3.94
Industry												
Human health activities	0.123	8.57	-0.035	-4.67	-0.040	-6.14	-0.016	-2.65	-0.015	-2.86	-0.018	-4.91
Legal, accounting	0.074	4.76	-0.019	-2.24	-0.008	-0.97	-0.018	-3.37	-0.016	-3.32	-0.013	-2.96
Real estate activities	0.152	11	-0.032	-3.6	-0.040	-5.23	-0.026	-4.71	-0.030	-8.26	-0.025	-7.31
Hotels / catering	0.163	15.61	-0.033	-5.01	-0.053	-10.86	-0.031	-8.1	-0.027	-7.44	-0.019	-5.48
Retail trade	0.082	7.13	-0.005	-0.75	-0.021	-3.71	-0.019	-4.81	-0.021	-5.88	-0.017	-5.32
Construction	0.104	8.65	-0.014	-1.89	-0.026	-4.21	-0.024	-5.87	-0.023	-6.2	-0.019	-5.77
Imports												
Imports	-0.311	-24.35	0.056	7.87	0.084	10.75	0.065	9.83	0.055	8.64	0.051	8.52
$\hat{P}$	0.801		0.050		0.053		0.035		0.032		0.029	
Number of observations = 6,482	4,698		349		467		341		307		320	
LR χ^2 (65) = 2108.14												
Log likelihood= Log likelihood = -5609.5289 Pseudo R²= 0.16												

Table 6.14: Model 6 (a) Services: Selectively constrained model

Dependent variable: Exporter	Non exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
Variables	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Distance from border												
Close to border	0.030	1.83	-0.006	-1.78	-0.009	-1.81	-0.006	-1.82	-0.005	-1.82	-0.004	-1.82
Subcontracting												
Foreign subcontractor	-0.196	-8.65	0.027	8.81	0.052	8.3	0.041	7.08	0.041	6.57	0.033	6.02
E-commerce ability												
No e-commerce	0.133	7.26	-0.027	-6	-0.040	-6.61	-0.026	-6.57	-0.023	-6.57	-0.017	-6.31
Fully e-commerce compatible	-0.056	-2.28	0.010	2.43	0.016	2.31	0.011	2.21	0.011	2.16	0.008	2.12
Public sector support												
Subsidy	-0.185	-3.61	0.024	5.63	0.048	4.12	0.039	3.35	0.040	2.99	0.033	2.74
Employment and labour												
Log of employment	-0.021	-3.48	-0.003	-0.95	0.005	1.28	0.005	2.03	0.006	2.76	0.009	6.15
Natural log of labour productivity	-0.024	-3.45	-0.006	-1.44	0.003	0.69	0.008	2.89	0.005	2.39	0.014	7.43
Regions/Domestic market												
Romania & Bulgaria	0.131	5.63	-0.028	-4.7	-0.040	-5.23	-0.025	-5.4	-0.022	-5.53	-0.016	-5.45
Benelux	-0.095	-2.36	-0.012	-0.74	0.002	0.07	0.020	1.1	0.028	1.66	0.058	3.49
Industry												
Research and development	-0.162	-3.13	0.022	4.51	0.043	3.48	0.034	2.93	0.035	2.67	0.028	2.48
Retail trade	0.094	5.06	-0.019	-4.46	-0.028	-4.78	-0.018	-4.84	-0.016	-4.91	-0.012	-4.82
Wholesale trade	-0.077	-2.89	0.013	3.18	0.022	2.96	0.016	2.77	0.015	2.67	0.012	2.58
Construction	0.127	6.22	-0.026	-5.21	-0.038	-5.74	-0.025	-5.83	-0.022	-5.92	-0.016	-5.76
Imports												
Imports	-0.371	-22.7	0.073	8.02	0.122	11.54	0.079	9.62	0.066	8.96	0.032	5.84
$\hat{p}$	0.732		0.068		0.084		0.048		0.040		0.028	
Number of obs. = 3669	2701		215		320		226		207		212	

Wald χ^2 (30)=   934.2

Log likelihood = -3588.6081   Pseudo ^{2} = 0.142

6.18.   6 (a) Services - Analysis

The models show the different effects of setting the model for ordered probit, multinomial and selectively parametized model. To reiterate: the aim is to find the effect variables have on firms with different levels of exporting age; if firms have been exporting for longer periods of time then the effect of variables on firms may change as firms have different levels of experience.

Comparing the models, the ordered probit (shown in Table 6.12) had the greatest number of significant variables. Different patterns show themselves with the variables tending to have the strongest effects on exporters from 1999-2004 (positive or negative) and the effect of the variables becomes much weaker on firms who have been exporters before 1985. One example of this, is that receiving a 'subsidy' had smaller positive effects on firms exporting since 2005-2008 of 1.8%, compared to a 3.7% increase for exporters since 1999-2004, decreasing to 3.0% for the most established exporters who stared exporting before 1985. Receiving a subsidy had a decreasing effect over time as predicted by theory, but the reduced effect on exporting for 2005-2008 does not fit into this theory as these exporters have the least experience. Perhaps initial exporters and their decision to export are based on other variables. Other variables that fit this same pattern include 'Foreign subcontractor' which increased from 2005-2008 which had a 1.7% increase, to 1999-2004 which increased to a 3.4% increase, to firms with experience from before 1985 which was a smaller 2.4% increase. The negative effects of e-commerce begin at -1.9% effects for exporters from before 1985, then increasing to -3.3% effects for exporters who started 1999-2004 and then decreasing to -1.4% for firms who started exporting 2005-2008. Negative effects from industries were easier to deal with for older exporters, for example 'retail trade'.

One unexpected result was that firms 'close to the border' were less likely to be exporters, having the largest negative effect on firms who had been exporting since 1999-2004 at -0.11%, also firms 'with no land border' had negative effects for all exporters, in both cases firms with more experience, such as exporters exporting before 1985, found a reduced effect, suggesting that distance has a weaker effect for firms that have been exporting for longer periods.   Innovation and technological co-operation has larger positive effects on the propensity to export for firms who have been exporting for shorter periods of time (2005-2008

and 1999-2004), again the largest positive increases for the propensity to export come for exporters who began exporting between 1999 and 2004. Possibly this shows that these firms need the innovation and co-operation to begin with and also to renew their contacts and ability to export, but over time this has less of an effect on firms that have been exporting for longer, perhaps as they have more experience. 'Labour productivity', which had an increase 0.5% for 2005-2008, and 'employment', which had a 0.5% increase for exporters before 1985, varied only slightly for firms with different lengths of exporting age experience.

Table 6.13 shows the results of the multinomial logit, which has fewer significant variables than the ordered probit; the model also has a low pseudo R^2. The key differences are that subsidy, which has a 7% effect to firms who began exporting in 2005-2008, decreases for firms who have been exporting since before 1985 to a 5.1% increase in propensity to export, and technological co-operation with a 2.6% increase for firms exporting since 2005-2008 to a 0.8% effect on firms exporting since before 1985. In these examples the variables have the largest effect on firms who initially exported in 2005-2008 and the effect of the variable declines across each level of exporting age showing that these variables are more valuable to initial exporters.

The selectively constrained model in Table 6.14 decided that the parallel lines are not imposed for 'log of labour productivity', 'imports', 'log of employment size' and 'Benelux'. The model has some unusual results, such as employment and labour productivity being negative for the first initial exporters; running counter to expectations.

6.19.   6 (b) Manufacturing

Table 6.15: Model 3 (b) Manufacturing Ordered probit

Variables	Non-exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Distance from border												
No land border	0.089	1.88	0.006	2.93	-0.007	-1.21	-0.021	-1.77	-0.029	-1.97	-0.039	-2.19
Innovation												
Product innovation ***	-0.073	-3.79	-0.008	-3.44	0.002	1.85	0.016	3.67	0.025	3.69	0.038	3.7
E-commerce ability												
No e-commerce ***	0.138	4.61	0.008	5.39	-0.012	-2.67	-0.033	-4.18	-0.044	-4.75	-0.057	-5.48
Public sector support												
Information ***	-0.113	-2.44	-0.018	-1.73	-0.006	-0.8	0.020	3.57	0.040	2.35	0.076	1.84
Employment and labour												
Log of employment	-0.066	-8.56	-0.007	-6.04	0.002	2.18	0.015	7.02	0.022	7.53	0.033	8.18
Regions/Domestic market												
UK**	-0.131	-2.88	-0.021	-2.02	-0.008	-0.96	0.022	4.44	0.047	2.77	0.090	2.13
Germany***	-0.119	-3.62	-0.019	-2.56	-0.006	-1.12	0.021	4.88	0.043	3.43	0.080	2.75
Benelux***	-0.123	-4.13	-0.019	-2.9	-0.006	-1.25	0.022	5.41	0.044	3.87	0.083	3.13
Spain***	-0.105	-3.16	-0.016	-2.31	-0.004	-0.92	0.019	4	0.037	3.01	0.068	2.49
Italy***	-0.202	-7.82	-0.041	-4.59	-0.027	-2.65	0.024	5.91	0.071	7.43	0.175	4.68
Nordic countries***	-0.164	-6.35	-0.029	-4.08	-0.013	-2.05	0.026	7.98	0.059	5.8	0.122	4.38
Poland*	0.078	1.88	0.006	2.89	-0.006	-1.21	-0.019	-1.77	-0.025	-1.96	-0.034	-2.19
Romania & Bulgaria ***	0.121	2.89	0.007	5.06	-0.011	-1.78	-0.029	-2.67	-0.038	-3.08	-0.049	-3.62
Partners and Activity abroad												
Invested abroad***	-0.125	-4.83	-0.019	-3.36	-0.006	-1.37	0.023	5.84	0.044	4.5	0.083	3.69
Industry												
Textiles***	-0.092	-3.29	-0.013	-2.5	-0.002	-0.71	0.018	3.76	0.033	3.12	0.057	2.73
Machinery**	-0.072	-2.64	-0.009	-2.11	0.000	-0.27	0.015	2.87	0.025	2.54	0.042	2.29

Variables	Non-exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Industry (cont.)												
Coke products**	-0.047	-1.58	-0.006	-1.35	0.000	0.36	0.010	1.67	0.016	1.54	0.026	1.44
Metal industry***	-0.079	-3.05	-0.010	-2.41	-0.001	-0.36	0.016	3.32	0.028	2.92	0.046	2.63
Publishing **	0.085	2.35	0.006	3.45	-0.006	-1.5	-0.020	-2.2	-0.028	-2.45	-0.037	-2.73
Imports												
Imports ***	-0.266	-11.87	-0.017	-6.14	0.021	4.52	0.062	8.94	0.084	10.35	0.116	11.61
$\hat{p}$	0.319		0.117		0.181		0.155		0.124		0.104	
Number of obs 1,819	635		174		26		244		22		27	
LR χ^2 (20) = 617.59 Log likelihood = -2758.6486 Pseudo R^2 = 0.10 H_0: omitted variables = 0.217												

*/**/* denotes significances at 1% level, 5% level and 10% level

Table 6.16: Model 6 (b) Manufacturing: Multinomial logit

Variables	Non-exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Innovation												
Product innovation	-0.102	-4.23	0.017	1.07	-0.018	-0.95	0.008	0.46	0.023	1.44	0.072	4.03
Public sector support												
Information	-0.195	-3.38	0.016	0.3	-0.017	-0.3	0.049	0.85	0.053	0.96	0.095	1.56
Employment and labour												
Log of employment	-0.073	-7.77	-0.010	-1.58	0.012	1.56	0.023	3.33	0.016	2.43	0.033	4.58
Partners and Activity abroad												
Invested abroad	-0.215	-6.15	0.002	0.07	-0.032	-1.13	0.030	1.05	0.064	2.17	0.150	4.27
Imports												
Imports	-0.347	-14.06	0.014	0.91	0.079	4.42	0.095	5.76	0.095	6.13	0.063	3.63
$\hat{p}$	0.313		0.111		0.165		0.139		0.123		0.147	
Number of obs 1,822	637		174		269		244		222		276	
LR χ^2 (30) = 555.46												
Log likelihood= -2754.6833												
Pseudo R^2 = 0.09												

Table 6.17: Model 6 (b) Manufacturing Selectively constrained model

Variables	Non-exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Distance from border												
Medium distance from border	-0.060	-3	-0.009	-2.62	0.002	1.24	0.016	3	0.022	2.86	0.031	2.78
Innovation												
Product innovation in-house	-0.072	-3.69	-0.010	-3.38	0.003	1.97	0.019	3.58	0.025	3.58	0.035	3.59
E-commerce ability												
No e-commerce ability	0.152	4.92	0.012	5.18	-0.018	-2.97	-0.041	-4.7	-0.047	-5.32	-0.058	-5.82
Public sector support												
Information to export	-0.108	-2.46	-0.023	-1.79	-0.007	-0.75	0.024	3.4	0.043	2.18	0.070	1.79
Labour productivity/ employment												
Log of employment	-0.063	-7.9	-0.009	-5.76	0.003	2.32	0.017	6.59	0.022	7.06	0.030	7.53
Regions/Domestic market												
Romania & Bulgaria	0.135	2.62	-0.005	-0.14	0.039	0.96	0.004	0.11	-0.065	-3.3	-0.108	-7.67
Italy	-0.119	-2.98	-0.083	-3.96	0.006	0.15	-0.042	-1.33	0.059	1.54	0.179	3.92
Partners and Activity abroad												
Enterprise invested abroad	-0.151	-6.71	-0.033	-4.51	-0.013	-1.97	0.031	7.51	0.061	5.58	0.105	4.55
Industry												
Metal industry	-0.039	-1.53	-0.006	-1.35	0.001	1.1	0.010	1.57	0.014	1.47	0.020	1.41
Publishing	0.117	3.13	0.010	4.8	-0.014	-2.01	-0.032	-3.06	-0.036	-3.48	-0.045	-3.8
Imports												
Imports	-0.333	-13.3	0.011	0.69	0.085	4.56	0.101	6.14	0.089	6.04	0.047	3.1
	0.315		0 .124		0.181		0.148		0.116		0.116	
Number of obs = 1819	635		174		268		244		222		276	
LR χ² (23) = 521.67												
Log likelihood -2757.1714												
Pseudo R²= 0.10												

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6.20. 6 (b) Manufacturing - Analysis

There were expected to be differences between manufacturing and services; previously the Heckman selection equation had shown that manufacturing model 4 (b) had different effects to services model 4(a), for example labour productivity was not significant; this is again the case with labour productivity not being significant in any of the 6(b) models.

Table 6.15 shows the results of the ordered probit, here interestingly the model shows that there is an ordered effect as over each subsequent firm of longer exporting age and experience, the effect of the variable becomes stronger. The results being stronger firms that have been exporting for longer might be useful for older firms as the variables maybe better at renewing the firm's ability these include; 'information', 'invested abroad', 'product innovation', and 'imports' all being negative for exporters who started exporting in 2005-2008, when in model 4 (b), shown in table 6.7, the variables had a positive effect on the propensity to export. Anomalous or strange results include 'no e-commerce ability' which is positive for firms who began exporting in 2005-2008, whereas in other models 'no e-commerce ability' has a negative effect on exporting, and log of employment which is negative in increasing the propensity to export for firms who had been exporting since both '2005-2008' and '1999-2004'; both results are not in line with the results in model 4(b). The model 6(b) passed the linktest (test of omitted variables rejects at 0.217 levels); though model 6 (b) has a low Pseudo R^2.

Comparing these results for the multinomial model in Table 6.16, few variables are significant; here as in the ordinal model employment' has a negative effect for 2005-2008. Some of the most positive effects in the model come from firms who had exported before 1985 , the pattern is not as clear as in the ordinal model, for example 'product innovation' has a -0.8% decrease in exporting propensity for firms who have exported since 2005-2008, then the effect becomes negative for exporters since 1999-2004 who have a -1.2% effect.

The selectively constrained model in table 6.17 selected through the use of the Wald test that parallel lines are not imposed for 'imports' and 'Italy', again there are some unexpected results, such as 'foreign subcontractor' and 'investing abroad' had a negative effect on the

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propensity to be an exporter between 2005-2008 and had the largest positive effects for firms who had been exporting before 1985.

The consensus of these models seems to be that 'employment' has a negative effect on the propensity to export for firms that have recently started to export, when the hypothesis was that more employment would give advantages to the firms. Additionally 'no e-commerce ability' has positive effects for initial exporters but has negative effects for older exporters. Perhaps the nature of initial exporters are that they have been exporting not by attracting clients but instead picking up unsolicited orders through their network of contacts and they do not need e-commerce. Instead the older exporters have reached a scenario where they need more help to be consistently exporting, with exporting more part of their definite business model. The more positive results for variables, such as 'information', 'invested abroad', 'product innovation', 'foreign subcontractor' and 'imports' for firms that have been exporting for longer suggests that these variables help revitalise older firms ability to export.
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6.21. 6 (c) All sectors

Table 6.18: Model 6 (c) all sectors Ordered probit

Variables	Non-exporters dy/dx	z-value	2005 -2008 dy/dx	z-value	1999-2004 dy/dx	z-value	1994-1998 dy/dx	z-value	1985-1993 dy/dx	z-value	before 1985 dy/dx	z-value
Distance from border												
No land border***	0.092	3.59	-0.011	-3.04	-0.024	-3.35	-0.022	-3.57	-0.020	-3.75	-0.016	-3.97
Innovation												
Product innovation themselves ***	-0.081	-5.33	0.007	5.39	0.019	5.36	0.019	5.19	0.019	5.06	0.017	4.86
Subcontracting												
Foreign subcontractor***	-0.151	-7.86	0.010	8.98	0.032	8.55	0.035	7.54	0.037	6.93	0.038	6.15
E-commerce ability												
No e-commerce ability***	0.124	6.7	-0.015	-5.3	-0.033	-6.04	-0.029	-6.47	-0.026	-6.8	-0.022	-7.14
Public sector support												
Subsidy	-0.105	-3.02	0.007	4.74	0.023	3.5	0.024	3.05	0.025	2.8	0.025	2.5
Employment and labour												
Natural log of labour productivity***	-0.032	-5	0.003	4.7	0.008	4.87	0.007	4.86	0.007	4.86	0.006	4.89
Log of employment***	-0.042	-7.62	0.004	6.66	0.010	7.14	0.010	7.15	0.009	7.17	0.008	7.21
Regions/Domestic market												
Italy***	-0.089	-3.16	0.007	4.23	0.020	3.5	0.021	3.17	0.021	2.96	0.021	2.72
Romania & Bulgaria***	0.131	4.87	-0.017	-3.75	-0.036	-4.35	-0.031	-4.84	-0.026	-5.29	-0.021	-5.93
Benelux***	-0.162	-5.27	0.009	9.22	0.032	6.73	0.037	5.34	0.040	4.67	0.043	3.98
Nordic countries**	-0.049	-2.08	0.004	2.35	0.011	2.18	0.011	2.07	0.011	2.01	0.010	1.93
UK***	-0.107	-2.84	0.008	4.22	0.023	3.24	0.025	2.87	0.026	2.65	0.025	2.38
Partners and Activity abroad												
Enterprise invested ***	-0.119	-5.12	0.008	7.05	0.026	5.79	0.028	5.09	0.029	4.68	0.029	4.16
Industry												
Computer and related***	0.106	3.15	-0.013	-2.53	-0.029	-2.87	-0.025	-3.16	-0.022	-3.42	-0.017	-3.82
Renting of machinery	0.161	3.96	-0.023	-2.93	-0.046	-3.49	-0.037	-4.03	-0.031	-4.57	-0.024	-5.41
Electricity, gas, water ***	0.264	7.25	-0.046	-4.67	-0.081	-6.04	-0.059	-7.6	-0.046	-9.22	-0.032	-10.87
Legal, accounting***	0.197	7.05	-0.029	-4.96	-0.057	-6.04	-0.045	-7.01	-0.037	-7.9	-0.028	-8.93
Other business activities***	0.085	3.1	-0.010	-2.59	-0.022	-2.88	-0.020	-3.09	-0.018	-3.27	-0.015	-3.53

Variables	Non-exporters		2005 -2008		1999-2004		1994-1998		1985-1993		before 1985	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Industry (cont.)												
Construction***	0.277	13.82	-0.045	-8.49	-0.082	-10.9	-0.063	-12.42	-0.050	-13.44	-0.036	-13.26
Retail trade***	0.233	11.6	-0.035	-7.65	-0.067	-9.5	-0.053	-10.68	-0.044	-11.58	-0.033	-11.89
Misc.	-0.061	-1.37	0.005	1.72	0.014	1.48	0.014	1.38	0.014	1.31	0.014	1.22
Human health activities***	0.239	7.86	-0.039	-5.2	-0.071	-6.58	-0.054	-7.96	-0.043	-9.26	-0.031	-10.56
Transport, travel ***	0.086	2.75	-0.010	-2.29	-0.023	-2.55	-0.020	-2.76	-0.018	-2.93	-0.015	-3.17
Hotels / catering***	0.308	14.15	-0.057	-8.25	-0.095	-11.02	-0.068	-13.14	-0.052	-14.41	-0.036	-13.8
Machinery***	-0.109	-2.82	0.007	4.68	0.023	3.3	0.025	2.85	0.026	2.61	0.027	2.32
Metal industry***	-0.144	-3.79	0.008	7.89	0.029	4.79	0.033	3.88	0.036	3.43	0.038	2.93
Coke products** *	-0.087	-2.1	0.006	3.06	0.019	2.38	0.020	2.12	0.021	1.97	0.021	1.79
Sale/repair of motor ***	0.115	3.58	-0.015	-2.83	-0.031	-3.24	-0.027	-3.59	-0.023	-3.9	-0.019	-4.37
Wholesale trade***	0.053	1.9	-0.006	-1.68	-0.014	-1.81	-0.012	-1.9	-0.011	-1.97	-0.010	-2.07
Textiles***	-0.148	-3.45	0.008	8.08	0.030	4.47	0.034	3.55	0.037	3.11	0.039	2.65
Real estate activities***	0.330	13.69	-0.064	-7.77	-0.104	-10.71	-0.072	-13.23	-0.054	-14.72	-0.036	-14.02
Other service activities***	0.126	3.9	-0.017	-3.03	-0.035	-3.51	-0.029	-3.91	-0.025	-4.29	-0.020	-4.84
Imports												
Imports***	-0.319	-22.15	0.029	11.91	0.074	15.78	0.073	15.79	0.072	15.58	0.070	14.47
$\hat{p}$		0.615		0.090		0.127		0.079		0.055		0.034
Number of observations= 4,905		2,859		326		517		401		373		429

LR χ^2 (33)   =   2105.70

Log likelihood = -5547.861

Pseudo R^2 = 0.1595

Ho: omitted variables= 0.199

Table 6.19: Model 6 (c) all sectors Multinomial logit

Variables	Non-exporters dy/dx	z-value	2005 -2008 dy/dx	z-value	1999-2004 dy/dx	z-value	1994-1998 dy/dx	z-value	1985-1993 dy/dx	z-value	before 1985 dy/dx	z-value
Innovation												
Product innovation themselves	-0.140	-10.4	0.037	5.1	0.036	5.1	0.031	5.41	0.016	3.41	0.019	4.36
Subcontracting												
Foreign subcontractor	-0.153	-8.07	0.014	1.61	0.033	3.47	0.035	4.45	0.036	4.77	0.035	5.14
Distance from border												
No e-commerce ability	0.108	8.42	-0.008	-1.13	-0.029	-4.2	-0.018	-3.23	-0.019	-3.85	-0.035	-8.24
Public sector support												
Subsidy	-0.260	-5.29	0.045	1.95	0.080	3.17	0.044	2.52	0.057	3.17	0.033	2.43
Partners and Activity abroad												
Enterprise invested abroad	-0.203	-7.88	0.026	2.14	0.042	3.29	0.045	4.17	0.029	3.24	0.061	5.7
Industry												
Machinery	-0.188	-3.96	0.014	0.73	0.010	0.57	0.068	3.29	0.060	3.26	0.035	2.49
metal industry	-0.264	-6.42	0.030	1.51	0.072	3.18	0.066	3.4	0.027	1.92	0.070	3.98
Human health activities	0.194	11.28	-0.049	-5.73	-0.060	-7.49	-0.027	-3.46	-0.025	-3.86	-0.032	-7.01
Legal, accounting	0.137	7.64	-0.031	-3.37	-0.020	-1.82	-0.031	-4.47	-0.027	-4.49	-0.027	-5.57
Real estate activities	0.229	14	-0.046	-4.79	-0.061	-6.79	-0.039	-5.19	-0.041	-8.16	-0.041	-10.79
Hotels / catering	0.247	20.77	-0.046	-6.2	-0.077	-13.7	-0.048	-10.08	-0.042	-9.89	-0.034	-8.1
Retail trade	0.153	12.08	-0.015	-2.07	-0.040	-6.14	-0.033	-6.93	-0.034	-8.38	-0.030	-7.83
Construction	0.173	12.5	-0.023	-2.85	-0.043	-5.76	-0.039	-7.63	-0.035	-7.96	-0.033	-8.08
Imports												
Imports	-0.366	-32.21	0.056	8.72	0.099	13.41	0.081	12.65	0.072	11.82	0.057	10.4
$\hat{P}$		0.71		0.07		0.08		0.05		0.05		0.05
Number of obs= 8,512		5,453		529		755		600		550		625

LR χ² (70) =   3380.32
Log likelihood = -8702.8627
Pseudo R²=   0.16

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Table 6.20: Model 6 (c) all sectors Selectively constrained model

Variables	Non-exporters dy/dx	z-value	2005 -2008 dy/dx	z-value	1999-2004 dy/dx	z-value	1994-1998 dy/dx	z-valu	1985-1993 dy/dx	z-value	before 1985 dy/dx	z-value
Distance from border												
Medium distance	-0.071	-4.38	0.008	4.52	0.019	4.39	0.016	4.22	0.012	3.96	0.012	3.96
Innovation												
Product innovation	-0.154	-8.66	0.024	2.28	0.054	4.51	0.041	4.83	0.012	2.42	0.012	2.42
E-commerce ability												
No e-commerce	0.139	7.16	-0.021	-5.69	-0.039	-6.55	-0.029	-6.85	-0.021	-6.59	-0.021	-6.59
Fully e-commerce	-0.046	-1.99	0.005	2.2	0.012	2.04	0.010	1.95	0.008	1.86	0.008	1.86
Employment and labour												
Natural log of labour productivity	-0.024	-3.36	-0.009	-1.98	0.000	-0.09	0.006	2.11	0.018	8.17	0.018	8.17
Log of employment	-0.036	-5.62	-0.005	-1.55	0.008	2.02	0.007	2.52	0.014	7.2	0.014	7.2
Regions/Domestic market												
Romania & Bulgaria	0.136	4.66	0.012	0.6	-0.055	-3.43	-0.020	-1.6	-0.046	-10.77	-0.046	-10.77
Benelux	-0.081	-2.17	-0.026	-1.61	-0.009	-0.44	0.004	0.22	0.073	4.34	0.073	4.34
Partners and Activity abroad												
Enterprise invested	-0.216	-7.04	0.046	2.28	0.063	2.9	0.070	4.12	0.019	2.38	0.019	2.38
Industry												
Machinery	-0.362	-7.81	0.032	1.04	0.048	1.27	0.163	4.15	0.033	2.13	0.033	2.13
Metal industry	-0.359	-8.4	0.029	0.96	0.151	3.67	0.082	2.68	0.063	3.36	0.063	3.36
Retail trade	0.166	8.33	-0.027	-6.3	-0.048	-7.45	-0.034	-7.88	-0.023	-7.44	-0.023	-7.44
Imports												
Imports	-0.422	-30.31	0.067	8.2	0.125	12.64	0.100	12.71	0.043	7.26	0.043	7.26
$\hat{p}$	0.611		0.090		0.118		0.072		0.063		0.045	
Number of observations= 4,920	2,864		328		520		403		375		430	

Pseudo R^2 =   0.16
LR χ^2 (53)   =   1541.07   Log likelihood = -5588.2898

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6.22.   6 (c) All sectors - Analysis of results

Model 6 (c) again looks at the questions of the effect of variables on firms of different levels of exporting age from three different types of model but containing all sectors , suggesting that the results will in part be an amalgamation of the results of 6(a) and 6(b). For example, the ordered probit shows that 'subsidy' and 'labour productivity' are significant. The pattern of the ordered probit once again is that the variables their largest possible effects on variables for 1999-2004, then slowly declining over time in their effect. This is supported by the multinomial logit and the selectively constrained models. The ordered probit, shown in Table 6.18, passes the test of misspecification (the link test at 0.199). Most variables have higher positive effects for older exporters suggesting that these variables are more likely to maintain the firm over time, such as 'foreign subcontracting' which has a 1.0% effect for exporters from between 2005-2008 and 3.8% for firms who started exporting before 1985.

The multinomial logit shown in Table 6.19 is more restrictive, resulting in fewer variables being significant. Many of the variables have higher positive effects for older exporters suggesting that over time the variables are better at renewing the ability of firms to export. However 'production innovation' does not fit this pattern, it has a 3.5% increase for exporters who started exporting between 2005-2008 and 3.6% for firms who started exporting between 1999-2004, and then decreasing to 2.4% before 1985.

The last model, shown in Table 6.20, parallel lines are not imposed for 'log of labour productivity', 'investing abroad', 'product innovation in-house', 'importing', 'log of employment size', 'Romania & Bulgaria', 'machinery' and the 'metal industry'.   In this model, unlike the ordinal and multinomial logit, 'investing abroad' it's largest effects for 1999-2004 and 1994-1998, while 'product innovation' is also greatest for exporters who started exporting between 1999-2004 and 1994-1998. 'Product innovation' is greater 2.4% for 2005-2008 and 1.2% for before 1985; investing abroad 4.8% for 2005-2008 and 2.2% for before 1985; and imports 6.4% for 2005-2008 and 4.1% before 1985.

6.23.   Summary of Models 6 (a), (b) and (c)

The models were estimated to understand the different relationships that affect the probability of being an exporter given that they had been exporting for lengths of times, from 2005-2008 to before 1985.

The first question to be answered is to which models represent the data better, the choices are between ordered probit, multinomial and selectively constrained model. Theoretically it is unknown what expected effects all variables may have and whether their parameters should be constrained. The selectively constrained model is an attempt to more scientifically decide, though violating the proportional odds assumption may have minimal implications. If a multinomial logit model is used it frees the model from the proportionality assumption, but it is less parsimonious. Therefore the gologit 2 model can be used as a compromise to not assume proportionality across all variables; using this model different variables are significant and some of the direction of the results are different, for example, 'employment' becomes negative for exporters since 2005-2008 for model 6(a) compared to the ordinal model. For example, the model 6(c) ordered probit shown in Table 6.16, has positive effects across all exporters with larger levels of 'labour productivity', while the selectively constrained model has negative effects for exporters between 2005 and 2008. It is hard to judge which type of model should be preferred, however one of the weaker models is the multinomial logit in model 6(b) where few variables are significant and the model has a low pseudo R^2 value, suggesting that it has not been a good choice to estimate the relationships between manufacturing and exporting.

The most important question these models where to answer is: is there an ordered effect where firms that have been exporting for longer periods of time and have more experience react differently in continuing to export. For services, models 6(a), there seems to be an ordered effect, shown in the ordered probit whereby the effect of variables is largest for 1999-2004 and then decreases for oldest exporters. This effect is also supported by the selectively constrained model and to a lesser extent by the multinomial logit; the multinomial logit shows that some variables, such as 'Subsidy' and 'technological co-operation' have a larger effect for initial exporters between 2005 and 2008. Overall, from the models in 6(a), it is clear that 'Subsidy',

'product innovation', 'technological co-operation' and higher levels of e-commerce ability are more valuable to exporters with less experience.

The relationships of the variables are different for manufacturing firms in Models 6(b), with the models estimating different variables to be significant. The relationship in the ordered probit is that the there is a clear ordered effect with the variables increasing or decreasing in their effect for each set of older exporters. For example, foreign subcontracting has a negative effect for initial exporters 2005-2008, this increase becomes more positive in each subsequent period of exporting experience, with the largest positive effects for firms who started exporting before 1985; this relationship seems to hold in the selectively constrained model. For manufacturing firms 'product innovation', having a 'foreign subcontractor' , more 'e-commerce' and 'information to help export' have more positive effects for older exporters suggesting that it helps renew firm's ability to export, rather than helps initial exporters.

Models 6(c) are a mixture of the firms from 6(a) and (b), plus mining firms; and the results are less clear. Some variables are better at supporting initial exporters from the periods 2005-2008 or199-2004, such as 'product innovation' and 'e-commerce ability'. 'Investing abroad' and firms of a' medium distance from border' also seem to have short term advantages over other firm. Less clear is' subsidy' which has greater effect for initial exporters in the multinomial logit, but greater effect on the older exporters in the ordinal probit.

6.24. Manager perceived barriers to exporting or reasons that they have problems with exports

As an attempt to explain some of the reasons that some types of firms choose not to export, for example for young firms or more productive firms, there can be some analysis done on the self perceived barriers to exporting, for exporters and would be exporters (firms who anticipate exporting within 2009-2010). The data includes somes explanation of the barriers that the firms believe they had. Here presented is the internal and external barriers felt at firms that are thinking of exporting in 2009-2010. This will began with a comparison of the barriers that firms, thinking of exporting perceive that they have, compared to the barriers that firms that are exporters think that they have.

Internal barriers to eporting

 Table 6.21 shows the internal barriers of the firms that are thinking of exporting, not all firms were able to answer the full set of questions.

Table 6.21: Dependent variables

Internal barriers	not at all				very much	Number of firms
	1	2	3	4	5	
1. Coping with language barriers	128	55	50	28	53	314
	40.76%	17.52%	15.92%	8.92%	16.88%	
2. Lack of sufficiently qualified personnel	112	43	57	43	59	314
	35.67%	13.69%	18.15%	13.69%	18.79%	
3. Quality of our products and/or services	104	40	37	43	88	312
	33.33%	12.82%	11.86%	13.78%	28.21%	
4. Specifications of our products and/or services	105	35	40	45	81	306
	34.31%	11.44%	13.07%	14.71%	26.47%	
5. Price of our products and/or services	81	39	63	52	78	313
	25.88%	12.46%	20.13%	16.61%	24.92%	
6. High cost of the internationalisation process	59	25	64	72	70	290
	20.34%	8.62%	22.07%	24.83%	24.14%	
7. Other barriers related to the enterprise	71	24	53	38	46	232
	30.60%	10.34%	22.84%	16.38%	19.83%	

Table 6.21 shows that the high cost of the internationalistion process, quality of goods and specifications of products are the largest problems perceived by there these firms. Coping with language barriers is the weakest problem for firms, perhaps dependent on the country they are trying to export to.

Table 6.22: Dependent variables Barriers for firms who are already exporting

Internal barriers	not at all				very much	Number of firms
	1	2	3	4	5	
1. Coping with language barriers	1724	538	470	307	421	3460
	49.8%	15.6%	13.6%	8.9%	12.2%	
2. Lack of sufficiently qualified personnel	1414	601	662	395	380	3452
	41.0%	17.4%	19.2%	11.4%	11.0%	
3. Quality of our products and/or services	1530	446	324	393	739	3432
	44.6%	13.0%	9.4%	11.5%	21.5%	
4. Specifications of our products and/or services	1377	483	462	474	546	3342
	41.2%	14.5%	13.8%	14.2%	16.3%	
5. Price of our products and/or services	797	505	780	646	682	3410
	23.4%	14.8%	22.9%	18.9%	20.0%	
6. High cost of the internationalisation process	826	538	831	552	508	3255
	25.4%	16.5%	25.5%	17.0%	15.6%	
7. Other barriers related to the enterprise	1024	277	489	320	369	2479
	41.3%	11.2%	19.7%	12.9%	14.9%	

For firms that are already exporters their greatest problem is that the quality of products and specfications of products and or services is greatly reduced. Some of the larger differences are that coping with language barriers and finding suitable staff is thought to be much less of a problem for exporters, suggesting that these firms through experience now have sufficient staff.

Additionally questions were asked for any external barriers for firms who are thinking about exporting, which are shown below in table 6.23.

External barriers to exporting

Table 6.23: Dependent variables

External Barriers	Inside the EEA		Outside the EEA	
	Percentage	Number of firms	Percentage	Number of firms
1. Lack of adequate information	58.7%	346	54.5%	332
2. Lack of adequate public support	63.9%	338	54.7%	327
3. Costs or difficult paperwork associated with transport	44.5%	328	49.5%	317
4. Tariffs or other trade barriers in foreign market	31.4%	309	43.3%	298
5. Other laws and regulations in foreign countries	41.5%	316	42.8%	304
6. Tariffs or other trade barriers in home country	33.2%	325	38.1%	307
7. Cultural differences (business culture)	25.7%	342	32.3%	328
8. Lack of capital or finance	62.5%	341	58.5%	328
9. Other external barriers	34.7%	271	34.5%	267

Table 6.23 shows that less firms are considering exporting outside the EEA. The largest concerns of the firms are lack of adequate public support and information and also lack of capital or finance. Larger concerns for firms wanting to export outide the EEA are cultural differences and tariffs. For comparison the concerns of the firms that are already will be exporting will be shown, to see if there is a noticeable difference in what the firms have overcome, the perceptions of firms researching exporting may over rate particular problems.

Table 6.24: Barriers for firms who are already exporting

External Barriers	Inside the EEA		Outside the EEA	
	Percentage	Number of firms	Percentage	Number of firms
1. Lack of adequate information	57.2%	3564	52.7%	3348
2. Lack of adequate public support	51.1%	3426	55.0%	3210
3. Costs or difficult paperwork associated with transport	62.9%	3529	53.9%	3277
4. Tariffs or other trade barriers in foreign market	71.3%	3455	56.0%	3222
5. Other laws and regulations in foreign countries	62.4%	3445	53.6%	3208
6. Tariffs or other trade barriers in home country	75.7%	3422	66.9%	3180
7. Cultural differences (business culture)	76.7%	3551	68.7%	3295
8. Lack of capital or finance	50.3%	3525	53.8%	3267
9. Other external barriers	74.0%	2814	74.4%	2696

Table 6.24 shows that firms who are already exporting find that costs of paperwork are some of the largest problems. Interestingly, though these firms may not be exporting to the same countries as the firms that are thinking of exporting in 6.23, it seems that paperwork, cultural differences and tarrifs are a much greater problem for firms who are already exporting.

This analysis can be taken further, for example examining firms that have existed for 10 years or less ('young firms') and also high productivity firms, to examine whether they are dominated by any particular type of barrier.

Barriers for 'young firms' who are thinking of exporting

Table 6.25: Barriers for young firms, who are thinking of exporting

Internal barriers	not at all 1	2	3	4	very much 5	Number of firms
1. Coping with language barriers	39	17	15	7	18	
	40.6%	17.7%	15.6%	7.3%	18.8%	96
2. Lack of sufficiently qualified personnel	28	13	18	16	21	
	29.2%	13.5%	18.8%	16.7%	21.9%	96
3. Quality of our products and/or services	24	16	15	14	26	
	25.3%	16.8%	15.8%	14.7%	27.4%	95
4. Specifications of our products and/or services	27	14	13	14	24	
	29.3%	15.2%	14.1%	15.2%	26.1%	92
5. Price of our products and/or services	23	12	17	23	18	
	24.7%	12.9%	18.3%	24.7%	19.4%	93
6. High cost of the internationalisation process	18	6	23	19	19	
	21.2%	7.1%	27.1%	22.4%	22.4%	85
7. Other barriers related to the enterprise	20	9	17	13	11	
	28.6%	12.9%	24.3%	18.6%	15.7%	70

Table 6.25 shows that the largest barriers for young firms are the lack of a quality product or service, the specification problems for a product or service and the high cost of the internationalisation process. Potential methods to improve these issues could include innovation, to improve the quality of products.

Table 6.26: External barriers for young firms, who are thinking of exporting

External Barriers	Inside the EEA Percentage	Number of firms	Outside the EEA Percentage	Number of firms
1. Lack of adequate information	55.3%	31	52.5%	31
2. Lack of adequate public support	65.7%	30	57.0%	30
3. Costs or difficult paperwork associated with transport	43.3%	21	48.9%	20
4. Tariffs or other trade barriers in foreign market	33.7%	49	40.5%	47
5. Other laws and regulations in foreign countries	37.4%	20	37.4%	18
6. Tariffs or other trade barriers in home country	36.8%	41	38.2%	40
7. Cultural differences (business culture)	24.3%	42	33.0%	41
8. Lack of capital or finance	61.4%	34	56.1%	33
9. Other external barriers	32.9%	28	31.7%	28

Table 6.26 shows that the greatest barriers they feel they face are different between inside the EEA or outside the EEA. This includes lack of adequate public support and lack of capital.

Barriers for firms with high productivity, who are thinking of exporting

Table 6.27: Internal barriers for the firms with high productivity who are thinking of exporting

Internal barriers	not at all				very much	Number of firms
	1	2	3	4	5	
1. Coping with language barriers	44	20	12	10	13	
	44.4%	20.2%	12.1%	10.1%	13.1%	99
2. Lack of sufficiently qualified personnel	34	11	23	13	16	
	35.1%	11.3%	23.7%	13.4%	16.5%	97
3. Quality of our products and/or services	36	14	8	10	28	
	37.5%	14.6%	8.3%	10.4%	29.2%	96
4. Specifications of our products and/or services	34	10	13	13	24	
	36.2%	10.6%	13.8%	13.8%	25.5%	94
5. Price of our products and/or services	21	12	18	19	26	
	21.9%	12.5%	18.8%	19.8%	27.1%	96
6. High cost of the internationalisation process	17	9	21	24	21	
	18.5%	9.8%	22.8%	26.1%	22.8%	92
7. Other barriers related to the enterprise	22	8	13	13	16	
	30.6%	11.1%	18.1%	18.1%	22.2%	72

Table 6.27 shows that the greatest concerns for high productive firms are quality and price of products, a recurring theme of a perceived barrier to exporting, whose best solution would be innovation.

Table 6.28: External barriers for the firms with high productivity who are thinking of exporting

External Barriers	Inside the EEA		Outside the EEA	
	Percentage	Number of firms	Percentage	Number of firms
1. Lack of adequate information	61.9%	65	59.2%	61
2. Lack of adequate public support	60.2%	62	53.5%	53
3. Costs or difficult paperwork associated with transport	53.0%	53	58.8%	57
4. Tariffs or other trade barriers in foreign market	37.1%	36	49.5%	47
5. Other laws and regulations in foreign countries	39.4%	39	45.9%	45
6. Tariffs or other trade barriers in home country	33.7%	34	38.1%	37
7. Cultural differences (business culture)	29.1%	30	38.8%	40
8. Lack of capital or finance	62.1%	64	59.8%	61
9. Other external barriers	37.3%	31	37.9%	33

Table 6.28 shows that the biggest barriers perceived by firms, are thatof adequate information, publicsector support and lack of capital as well as to a lesser extent costs of paperwork. Outside the EEA theere are greater cultural differences and tariffs.

6.25.   Conclusion

The firm level SME data from the EIM/GDCC 2009 survey has been used to estimate four models.

The models have shown:

1. What factors determine whether a firm becomes an exporter (Model 4)

2. What factors determine exporting intensity (Model 4)

3. Analysis of the relationship between variables that determine the levels of exporting experience (Model 5)

4. What factors determine whether a firm is an exporter given that they have already exported and hence have already overcome barriers to export (Model 6) and which model is most appropriate (ordinal , multinomial , or selectively constrained model.)

In the earlier literature review in section 2 there were many expectations and hypotheses that could be made as to the effect of each variable based on economic models, such as the incremental model of internationalisation or Melitz's (2003) model. The most marked difference in the selection and outcome equation of the Heckman 2 stage model used in Model 4 is that labour productivity was significant for services firms selecting into being exporters, but for exporting intensity was not significant perhaps as low labour productivity is a barrier to export but not something which improves the ability of a firm to export afterwards or also affects domestic sales. Model 5 shows labour productivity is significantly correlated with exporting experience for model (a) and model (c), though it is not significant for manufacturing firms in model (b). Interestingly when labour productivity is examined for model 6, it is positive for the ordered probit in model 6 (a) but is not significant for manufacturing in model 6 (b).

Three different possible problems with the models have been tested for and different solutions applied.

- Model specification error in the selection equations in Model 4 and in the ordinal probits in Model 6 for what determines an exporter, could have model specification errors, to test for this the models were tested with the stata command linktest. The models were not significant at the 15% level of significance, suggesting that the models were not misspecified.

- Sample selection bias may have occurred in Model 4 and therefore the Heckman equation was applied as explained previously. Model 4(b) did not need the Heckman solution according to the test for independent equations, but model 4(a) and 4(c) did.

- Failure of the parallel lines assumption. Model 6 could be estimated by too many parameters or too few, so in addition to an ordinal probit and multinomial logit, a test was run on each variable to see which variables should be constrained by the model based on whether the variable failed the parallel lines assumption. This allows three alternate views of the models.

Generally the hypotheses for the variables that select into exporting followed the expected direction, but not all hypotheses (Section 6.1) went as predicted by theory. The next stage was to identify whether it was different for exporters of different exporting ages as older exporters may have different effects. Model 6 used an ordinal, multinomial logit and a constrained Model (selectively constrained based on the gologit2 Model). These models have similar variables but many variables fail to get into the multinomial model as the IIA is more restrictive. Potentially the selective models produce the best results as the parallel line assumption has been tested on each variable. Depending on which model is preferred is as a more accurate representation 'e- commerce' and 'innovation' seems to be amongst the main factors that help firms that are initial exporters, for example, for service in models 6(a), 'no-ecommerce ability' is negative, but is less of a problem for older exporters. However once again manufacturing shows a difference to services and here 'no-ecommerce ability' has different effects with older exporters having a larger negative effect, lack of e-commerce is

more of a problem for older exporters. Model 6 suggests that innovation is important for initial exporters in the service industry and is more important in maintaining firms as exporters in the manufacturing industry. Other variables that had an initially larger positive effect on initial exporters in Models 6(a) were 'imports' and 'investing abroad' suggesting that if firms were encouraged to do these activities it could directly help them to become exporters. For models 6(b) 'investing abroad' had a greater effect on older exporters, as did using 'imports', though 'imports' had most of a positive effect for firms who started exporting between 2004-1993.

There have been many interesting results in the models, for example, 'subsidy to export' which is significant in Model 4 as a variable which increases exporting propensity, exporting intensity and exporting experience for service firms but not increasing exporting experience for manufacturing firms in Model 5.

6.26 Policy implications

Model 4 shows that countries with no land borders will struggle to export. However this is offset by some countries such as the UK having positive effects elsewhere in the model, meaning that the main effect is on Malta, Iceland and Cyprus. All types of innovation are associated with exporting and therfore should be encouraged by the government as is foreign technology co-operation. Additionally e-commerce such as full e-commerce is positive, though reducing orders to only online has a negative effect, suggesting that both form of sales gathering, online and not online need to work in tandem. Additionally there is a country effect, suggesting that location and institutions change the ability of firms to export. Therefore this shows that there is an importance for institutions to change to become more export friendly and an export friendly culture to be supported and maintained.

Having learned what makes it more likely for a firm to be an exporter, the second question is how successful the firm will be at exporting, though this might be offset by variables having a negative effect on domestic sales. Depending on whether that is necessary or preferred, subsidies can increase the levels of exporting intensity. Additionally some areas as exporting destinations seem to bring higher levels of intensity, so by encouraging exports to countries such as north America , or within Europe, the countries which might have higher cultural ties

to Europe. Otherwise regions such as China and Japan, for the firms that are exporting have links with higher levels of exporting intensity.

This shows the effects of different variables in conjunction with the length of time that the firms have been exporting. Therefore there are different effects that might be picked up by older exporters, that are more effective at maintaining firms as exporters or not. Subsidy and foreign technological co-operation are more important for newer firms and this is supported in that product innovation and higher levels of e-commerce ability will all be more useful to initial exporters.

7. Conclusion

7.1. Introduction

This thesis has investigated the determinants of exporting for firms in Scotland, using the GCS 2006 and a self-made survey 2010. Additionally, based on the exporting propensity score from the models from chapter 4 interviews were conducted to Scottish firms in 2011. Finally, firm data level from EIM/GDCC was used to examine the determinants of exporting across Europe for 2009.

The next section will describe the contribution to the literature that has been made by this thesis. The third section will set out the main findings from chapters 4, 5 and 6. The fourth section will mention the contribution to knowledge. The fifth section will make some policy recommendations on the basis of these findings. Section 7.6 will provide some suggestions for future work that could be done in this area and the final section concludes.

7.2. Contribution to the Literature

The contribution to the literature has been of gaining new sources of information on exporting in Scotland. Firstly, the dataset that was used for model 2, and models 3 (a) and 3 (b) in chapter 4 was created with a survey, which contained questions based on exporting theory. This survey was shown to have improved information as the extra variables created, such as the absorptive capacity variables, created a better model in terms of predictive power; this survey was followed up with interviews in chapter 5 and further empirical work in chapter 6 using the EIM/GDCC.

The second contribution to the literature was methodological, with the work showing a more holistic view, with quantitative probits and qualitative interviews. This is the first time to my knowledge that there has been a combination of interviews with econometric models in Scotland. The extra information from the EIM/GDCC survey provided support for some of the results from chapter 4, while allowing extra variables to be used such as e-commerce and exporting intensity, and econometric techniques such as the Heckman model to guard against sample selection bias.

7.3. <u>Principal Findings</u>

Six models were used in this thesis (4, 5, 6 have parts a, b and c for manufacturing services and combined, respectively). Below is a list of the types of variables that were significant in the models.

Table 7.1: Summary of models

Chapter	Model	Data used	Aim	Significant variables	Direction of results
4	1	GCS 2006	Determinant of exporting, Scottish data	Industry Region Employment Outward FDI Foreign owned Single enterprise	+ + and - - + + +
4	2	Created survey 2010	Determinants of exporting, more recent Scottish data limited to same variables as model 1	Industry Region Employment Outward FDI	+ + - +
4	3a	Created survey 2010	Determinants of exporting, more recent Scottish data using fuller data set	Industry Region Outward FDI Absorptive capacity variables Previous exporting Management experience Innovation SDI support Age of firm	- + and - + + and - + + + and - + +
4	3b	Created survey 2010	Determinants of exporting, more recent Scottish data using fuller data set	Industry Region Employment Absorptive capacity variables, Previous exporting Management experience Innovation	+ and - + and - - + and - + + + and -

Chapter	Model	Data used	Aim	Significant variables	Direction of results
6	4	EIM/ GDCC 2009	Determinants of exporting	Distance from border Innovation Subcontracting E-commerce ability Public sector support Labour productivity and employment Regions/ Domestic market Partners and Activity abroad Industry/service sector Imports	+ and - + + + and - + + + and - + and - + and - +
6	4	EIM/ GDCC 2009	Determinants of exporting intensity	Age of firm Distance from border Innovation Subcontracting E-commerce ability Public sector support Employment Regions/ Domestic Partners and Activity abroad Industry/service sector Export destination Import origin	- + and - + and - + + and - + + - + and - + and - + and - +
6	5	EIM/ GDCC 2009	Determinants of exporting experience	Age of firm Distance from border Innovation Subcontracting E-commerce ability Public sector support Labour productivity and size Regions/ Domestic Partners and Activity abroad Industry/service sector Import origin	- + and - + + + and - + + + + and - + and - +
6	6	EIM/ GDCC 2009	Determinants of exporting across firms of different ages	Distance from border Innovation Subcontracting E-commerce ability Public sector support Labour productivity and size Regions/ Domestic Partners and Activity abroad Industry/service sector Imports	Effects vary across the models

Chapter 4 showed the determinants of exporting in Scotland, first with the GCS 2006 and then with the self-made survey 2010. The survey was designed to provide more information and it

succeeded providing the basis for a much improved probit model. The questions were balanced to provide as much information as possible, with variables such as strong culture and strong management proving to be significant. In particular the sources of information factors, which represent the way firms gain knowledge, were found to be significant as the firms with better ways of absorbing information and hence higher levels of absorptive capacity should be able to develop into exporting more easily.

The models of chapter 6 had different aims such as to determine exporting intensity, exporting experience and the determinants of firms of different ages. The implications of these models are that there are several effects as predicted by theory that enable a firm to export however these factors and variables are different to exporting intensity ,and experience. For example, firms with higher labour productivity are more likely to export; this does not affect exporting intensity, but increases exporting experience as measured in Model 5 (section 6.7). Another interesting result predicted by theory is that predicted by theory – that different subsets of sectors, such as (a) services and (b) manufacturing are affected differently by different variables. To take labour productivity as the example, labour productivity was not significant in the selection equation for Model 4 (b) but was in the selection equation for Model 4 (a) and (c), the same relationship occurs in Model 5, labour productivity not significant in Model 5(b) but significant in Model 5(a) and (c). From these results could be inferred that the relationship between exporting and services is much different than the relationship between exporting and manufacturing. To increase the propensity of exporting and also the intensity of exporting, policy can be linked to : (a) through strengthening innovation activity and firm capabilities and higher labour productivity which will both enable and motivate firms to overcome export market entry costs/barriers (b) 'subsidies' can have a positive effect on increasing firms ability to export and for maintaining the firm as an exporter, this is stronger for services; 'information' seems more helpful for manufacturing firms, perhaps higher costs of exporting for manufacturing firms mean that the subsidies are not at a sufficient level (c) e-commerce is positive in helping exporters and lack of e-commerce could have many negative consequences on exporting.

The empirical evidence presented in this study found sector to be important in selecting exporters in Scottish self-made survey 2010 (e.g. 'manufacture furniture' and 'manufacture of

other machinery' had higher propensities to export in model 3 (b)); European survey EIM/GDCC (e.g. 'machinery', 'metal industry' and 'retail trade 'had higher propensities to export in model 4); exporting intensity (e.g. 'wood products', 'machinery' and 'textiles' had higher exporting intensities in model 4); and exporting experience (e.g. 'machinery', 'miscellaneous manufacturing' and 'metal industry' increased exporting experience in model 5). The firms that undertook more process and product innovation, and were involved in higher levels of cooperation (on innovation activities) were more likely to export. This shows the value of types of innovation of overcoming entry barriers into overseas markets with product innovation being significant and for model 6(a) these effects were more positive for services firms that started exporting 2005-2008 and between 1999-2004; suggesting it helps especially with the barriers to export that new exporters face, however the models based on the manufacturing industry, in models 6(b), show that product innovation has a larger effect on older exporters, perhaps renewing their product base and allowing them to be more competitive. E-commerce was significant in most models in chapter 6, with the 'no–e-commerce ability' negative for the propensity to export and 'all e-commerce ability' was positive to export in model 4, it had negative effects in taking 'orders online' in model 4, which 'fully e-commerce ability' increased exporting experience across all sectors in model 5.

Interviews undertaken in chapter 5 showed that there were other considerations that needed to be taken into account, with some of the principals motivations from exporting including unsolicited orders, while some firms could be successful exporters, even if they were small firms as with weak market power, the firms could be small but if they had a niche they could support themselves. Firms can also improve their ability to export by networking, which is a more informal arrangement that allows them to gain information at reduced cost. This improves their knowledge and gets past many barriers to exporting. Another way to become a successful exporter is by offering a unique or high quality product or by offering a broad range of services. Firm F owned the copyright to a good that is legally required for the market it sells to and has few competitors. The advantages of being based in Scotland, is that it gives access to a highly advanced bioscience industry and oil industry. Additionally, there are some cultural and social advantages that come from being Scottish, fore example, Firm L using the Scottish brand to sell.

7.4. <u>Contribution to knowledge</u>

Overall, this research study has helped to fill the research gap at firm level analysis of the Scottish export data. Previous studies have used different sources of information but the self made survey helps to study Scottish data specifically, as do the interviews in chapter 5. This thesis is additionally supported by examining European SME's 2009, using data that has not to my knowledge been used in the way here.

7.5. <u>Policy Recommendations and implications</u>

It is clear that more detailed information improves the models. Information on absorptive capacity of the firms, as expected as shown in many studies including Harris and Li (2009), shows that in determining the likelihood of firms exporting this level of information would be useful for further surveys. It would also be useful for organisations such as SDI. Support programmes to help firms should take into account the absorptive capacity of firms for change. Improving the absorptive capacity of firms is an additional method that government support programmes should use, for example, improving co-operation with international firms, clients and suppliers, and universities helps to increase the propensity to export.

For the Scottish specific data, there is weak evidence that for model 3 (a) older firms were more likely to export, weakly suggesting that they could be better candidates for policy-maker support. Model 3 (a) and 3 (b) are the two best models, the implications are that better sources of innovation, such as stronger national co-operation on public research and public domain sources, use of public domain sources and strong international co-operation between client and suppliers. Both models suggest that gathering management experience for workers outside Scotland and the SDI support programme is already increasing the propensity of firms to export, though it was not at the 10% significance level for model 3(b). Additionally, there are some firms that will be more likely to export and if SDI support is rationed it would more likely that certain types of firms would find it easier to export and the SDI support might be more successful with those firms. For example, Lanarkshire in model 3(a) and 3(b) has a negative propensity to export; perhaps extra effort needs to be made to provide better transport links. Model 3 (a) is a worse model than 3(b) in terms of a lower pseudo R^2 and correct classification, but it interestingly suggests that management techniques, such as TPM and

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continuous improvement used for one year, can improve the ability to export. Another interesting conclusion is that firm size has no effect in model 3 (a); while model 3(b) has negative effects for firms that employee between 50 and 180, suggesting that candidates for SDI support should not be limited to larger firms.

Chapter 5 shows that many firms are reactive and may export, if they export, due to encouragement from outside, rather than being pro-active. This suggests that there might be room to make more firms exporters. In terms of extra jobs and extra demand as a result of exporting, of the firms interviewed some were in a niche market. These firms would struggle to survive without their international presence.

Many of the variables not only help firms become exporters but as shown in chapter 6, also maintain firms as exporters; increasing exporting experience or making it more likely for firms that have already exported to continue to export. This is extremely important from a policy perspective as it shows how firms can be improved or encouraged to export based on these abilities.

Innovation, which helps improves the products and the services of the firms has been shown to be significant in creasing the ability of firms to export, this suggests that the government needs to help support such activities , perhaps with grants. Additionally e-commerce was found to be significant in the European 2009 models, suggesting that there needs to be higher levels of e-commerce, suggesting potential benefits from government support improving infrastructure, such as better broadband access and other new internet technologies, and also making sure that e-commerce is fully supported by the education sector, so that workers are fully prepared for it.

The managerial abilities relate to firms that were interviewed seemed to show that many of the biggest problems that firms found were that they could not hire enough exporting marketing orientated managers, which means that they could not grow their exporting business their most. Additionally some types of workers such as in the oil industry, would need to be willing to travel for their job. For the intermittent exporters, for them to become more responsive to exporting may require a more export orientated mindset. Additionally ways that might improve methods for firms exporting would be to make the firms more innovative; in the case studies for example it was clear that the more innovative

firms had created more unique and more useful products, making them more useful for the competitive world market and indeed a perceived barrier to exporting by firms is that there are problems with the quality and price of their goods, which could be improved by innovation.

There are additional important implications for the management structure for firms, with management experience selling outside Scotland important in model 3(a) and 3(b). Increasing management experience of working outside Scotland should improve the firm's capacity to export. This issue was also mentioned by the firms interviewed in chapter 5, some of these firms found that they had a lack of capacity to export and that they had lack of skills exporting. Increased support from the government to encourage these management skills and management contacts would improve the ability of firms to export. This could be helped through encouraging networking. From a policy standpoint an increased emphasis on organizations making network contacts should improve the ability of firms to export as the cost of knowledge and of market opportunities decreases. For example, model 6 shows that 'sales offices' abroad, 'offices to acquire inputs' abroad and 'having partners in other countries in the EU', increase the propensity to export presumably in part due to the extra level of contacts this brings. Chapter 6 shows are some significant differences between the manufacturing and non-manufacturing models in terms of what determines exporting, exporting intensity and exporting experience plus different effects for firms that have been exporting for different lengths of time. For example, support programmes should be tailored in different ways to different types of firms, for example, e-commerce was less significant across the model presented in chapter 6 for manufacturing firms and could therefore be less of a priority.

7.5.1. <u>Performance of firms in term of employment and turnover</u>

There is some weak evidence for exporting firms being better than non-exporting firms at growing jobs and increasing turnover. For the European data in chapter 6, shown in section 6.2, there is a small improvement in the firms who were exporting 2006-2008 between a growth of employees from 2007 to 2008 and also an increase in turnover, though this analysis does not take into account the differences caused by the different characteristics of exporters compared to non-exporters. Analysis of the case study firms in Chapter 5, mentioned in section 5.12.1, suggests that jobs are created for the niche exporters, without having a large enough market to

support themselves through exporting; the business model of the firm may fail. Some of the exporting firms relied on the exporting trade, while others used it as an intermittent source of demand. Some of the firms only export, as the type of job that they do is not needed in this country, due to the specific uniqueness of the job requirements. Additionally many of the firms that export have used the exporting as a source of growth, but some of the firms do not rely on exporting. For the intermittent exporters it is an extra source of demand, but not crucial enough for the firms to change their business plan to constantly maintain an exporting presence.

7.6. <u>Which firms to choose for public sector support</u>

Another important question for policy makers is that given that support to export may need to be rationed, which firms should be chosen to be supported. For example, higher levels of exporting experience are more likely in firms that have higher levels of labour productivity, which is shown in section 6.11 and also the selection equations in section 6.8 shows that higher levels of labour productivity makes firms more likely to export. This makes choosing more productive firms an optimum choice as candidates for public sector support. Additionally levels of exporting experience are negative for older firms, in section 6.11, and therefore it would be more efficient to choose more productive younger firms. This would be as these firms would benefit the most from the public sector support. However this is slightly different to the Scottish firms, here it seems that older firms actually have a small advantage in exporting, Scottish firms maybe a special case.

The method of supports analysed here includes information and subsidy to export. In chapter 6, information to export was only significant for manufacturing firms, shown in Table 6.9 in section 6.10, suggesting that it has a weaker effect than public sector support subsidy, which is significantly positive in models for services, manufacturing and all sectors in table 6.9. Additional measures to improve the ability of the firms to export, include technological co-operation with foreigners might be encouraged, It might also be preferable as part of support programmes to encourage foreign firm as partners to the firms and also upgrade the firms so they can became fully e-commerce compatible. For younger firms and firms there might be problems that are specific, to them and this is analysed below.

7.7. <u>Barriers to exporting in particular for younger firms and firms with higher productivity</u>

Potentially the analysis of managerial, internal and external barriers in the Chapter 6 data, in section 6.24, shows the biggest problems that firms face in exporting. To analyse this further

new firms and high productive firms were particularly examined. The largest barriers that firms felt that they faced were very similar, for new firms thinking of exporting this included potential problems in the quality or specification of their products, internally, which suggests that as younger firms they could overcome those problems through the answers that have been suggested throughout this thesis, that innovation could improve the specification and quality of products. External barriers that young firms feel that the have in-exporting, are a lack of finance or public support. For firms with high productivity, the main difference is that price of products or services are a much higher concern, this might be improved through innovation, particularly process innovation. External barriers still have a lack of public support and finance as an issue, but a lack of information on exporting is also more of a problem to these firms.

In summary younger firms have greater problems in improving the quality of their goods and services to compete internationally, while for firms with higher productivity their concern include the quality of their goods and services, but their greatest concern is the price of the products or services or services. To improve both these areas, innovation, such as product and process, may reduce these problems and as probits in model 3 (a) and (b) and throughout chapter 6 show a link between these forms of innovation and exporting. Externally both younger and more highly productive firms believe that more public support and more financing could improve their ability to export. A potential remedy would be to offer more finance to these firms, in some manner, such as via the government, this is supported by the models in chapter 6, which have public sector support in the form of subsidies as significant. Another possible area of government intervention is in providing information to firms on exporting, this was found to be significant in some of the models in chapter 6, such as for manufacturing firms.

The case studies in chapter 5 also bring some light into the matter. Comparing the younger firms, the successful exporters had undertaken innovation, in designing new products that made their products stand out. This innovation allowed them to export, despite the relative young age of the firm.

7.8. <u>Suggestions for Future Research</u>

There were constraints on the size of the number of firms that could be interviewed. The repertory grid analysis did not work completely satisfactorily; more time could have been taken with each interview, this would allow more repertory grids to be completed.

Further extensions of these models would require asking extra questions. For example, e-commerce was significant in the models based survey data from Europe; perhaps a value of the level of the e-commerce could be collected to determine the ability of firms to export in Scotland, this information in hindsight could have improved the self made survey 2010, however there were limits to the questions that could be asked. Another interesting possibility would be to have more than one year's worth of data across all the models to compare to see if the results hold. Perhaps firms could be identified by econometric modelling and then visited over a period of years to understand their processes.

7.9. <u>Conclusion</u>

This chapter is a conclusion to the thesis. It began by setting out the contribution made by this thesis to the literature and the principal findings, including the significant variables in the models have been reported and some suggestions for future work were made.

Appendix

Table A 1: Structure matrix of factor loadings: correlations between variables and rotated common factors: [a]

Input Variables[b]	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Uniqueness	Kaiser-Meyer-Olkin Measures
Sources of information from							
Within your enterprise or enterprise group	0.424	0.081	0.010	0.421	0.295	0.549	0.820
Suppliers of equipment, materials, services, or software	0.699	-0.102	0.068	0.062	0.041	0.491	0.790
Competitors or others enterprises in your industry	0.554	0.140	-0.169	0.065	-0.065	0.636	0.754
Consultants, commercial labs, or private R&D	0.266	0.007	-0.085	0.616	0.085	0.535	0.833
Universities or other higher education institutions	0.026	0.115	0.025	0.765	0.087	0.393	0.683
Government or public research institutes	0.282	0.001	0.356	0.558	-0.133	0.465	0.733
Conferences, trade fairs, exhibitions	0.574	0.043	-0.009	-0.211	0.164	0.597	0.820
Scientific journals and trade/technical publications	0.586	-0.117	-0.045	0.234	0.004	0.586	0.812
Professional and industry associations	0.634	-0.116	0.077	0.315	-0.052	0.477	0.876
Technical, industry or service standards	0.635	0.158	0.070	0.105	-0.191	0.519	0.785
Clients or customers	0.711	0.171	-0.074	0.004	0.242	0.401	0.836
Co operation partners:							
Clients customers international	0.102	-0.124	-0.180	-0.019	0.738	0.397	0.842
Enterprise group national	0.073	0.596	0.061	0.075	0.086	0.622	0.872
Enterprise group international	-0.030	0.038	0.175	0.205	0.576	0.593	0.754
Competitors international	0.040	0.176	0.486	-0.023	0.342	0.614	0.836
Suppliers national	0.247	0.628	-0.073	-0.060	0.111	0.524	0.831
Competitors national	0.238	0.619	0.190	-0.272	0.039	0.449	0.820
Suppliers international	0.133	0.204	0.254	0.014	0.682	0.411	0.839
Clients customers national	0.276	0.628	0.010	-0.147	0.227	0.457	0.823
Consultants international	0.033	-0.011	0.716	0.106	0.259	0.408	0.786
Public research national	0.113	0.726	0.182	0.217	-0.081	0.373	0.823
Public research international	0.089	0.088	0.770	-0.009	0.050	0.389	0.786
Input Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Uniqueness	Kaiser-Meyer-Olkin Measures
Universitiesother HEIs national	-0.023	0.635	-0.019	0.528	0.120	0.304	0.823
Universitiesother HEIs international	-0.009	0.026	0.803	0.163	0.182	0.294	0.786

| Consultants national | 0.046 | 0.696 | 0.010 | 0.235 | 0.094 | 0.450 | 0.823 |

Overall =0.7856

9. [a] Factors extracted using principal-component method (all factors with eigenvalues > 1), then rotated using orthogona
10. l varimax technique.
11. [b] Respondents were asked to strongly agree (coded 2), agree (coded 1), neutral (coded 0), disagree (coded -1) or strongly disagree (coded -2) with each statement.

Table A 2: Structure matrix of factor loadings: correlations between variables and rotated common factors: Management techniques used for 1 year [a]

Input Variables	Factor 1:	Factor 2:	Uniqueness	Kaiser-Meyer-Olkin Measures
Lean	0.061	0.475	0.771	0.391
TPM	0.441	-0.621	0.419	0.675
ISO9001	0.799	0.086	0.355	0.786
IiP	0.333	0.680	0.427	0.654
EBEM	0.579	0.070	0.659	0.850
ISI4001	0.707	0.071	0.495	0.784
Continousimprovemnt	0.744	-0.022	0.446	0.732
TQM	0.553	0.386	0.545	0.737
				Overall =0.741

[a] Factors extracted using principal-component method (all factors with eigen values > 1), then rotated using orthogonal varimax technique.

Table A 3: Structure matrix of factor loadings: correlations between variables and rotated common factors: Management techniques used for two years [a]

Input Variables	Factor 1:	Factor 2:	Uniqueness	Kaiser-Meyer-Olkin Measures
Lean	0.504	0.494	0.502	0.744
TPM	0.436	0.454	0.604	0.726
ISO9001	0.707	0.094	0.492	0.799
IiP	0.588	-0.227	0.603	0.652
EBEM	0.492	0.257	0.692	0.621
ISI4001	0.681	0.152	0.514	0.774
Continousimprovemnt	0.657	0.084	0.561	0.694
TQM	-0.123	0.831	0.294	0.521
				Overall = 0.717

[a] Factors extracted using principal-component method (all factors with eigen values > 1), then rotated using orthogonal varimax technique.

Table A 4: Structure matrix of factor loadings: correlations between variables and rotated common factors: Products and services issuesa [a]

Input Variables[b]	Factor 1:	Uniqueness	Kaiser-Meyer-Olkin Measures
We regularly compare our products and services with those of our competitors	0.401	0.839	0.552
We are committed to making our existing products and services obsolete by introducing new ones	0.530	0.719	0.809
Our products and services use better technology than our competitors	0.869	0.245	0.549
Or products/services have a high level of technology built into them	0.826	0.319	0.556
			Overall =0.573

[a] Factors extracted using principal-component method (all factors with eigenvalues > 1), then rotated using orthogonal varimax technique.

[b] Respondents were asked to strongly agree (coded 2), agree (coded 1), neutral (coded 0), disagree (coded -1) or strongly disagree (coded -2) with each statement.

.

Table A 5: Structure matrix of factor loadings: correlations between variables and common factors: Management [a]

Input Variables[b]	Factor 1:	Uniqueness	Kaiser-Meyer-Olkin Measures
Management fosters creative thinking and innovation in the company	0.802	0.357	0.822
If the company is performing well, change is still a priority	0.749	0.439	0.759
Our top managers continually like to try new ways of doing things	0.832	0.308	0.772
Management encourages everyone in the organization to come up with new ideas.	0.822	0.324	0.802
The management team take time to think constructively/creatively about the future	0.557	0.690	0.828
			Overall =0.792

[a] Factors extracted using principal-component method (all factors with eigenvalues > 1)
[b] Respondents were asked to strongly agree (coded 2), agree (coded 1), neutral (coded 0), disagree (coded -1) or strongly disagree (coded -2) with each statement.

Table A 6: Structure matrix of factor loadings: correlations between variables and rotated common factors: Business Direction[a]

Input Variables[b]	Factor 1:	Factor 2:	Uniqueness	Kaiser-Meyer-Olkin Measures
The main problems of the business are obtaining customers and delivering the product or service.	0.873	0.156	0.213	0.418
The Company now has sufficient customers and satisfies them sufficiently with its products or services.	-0.721	0.369	0.344	0.431
The decision currently facing management is to keep Scottish activities stable and profitable (rather than to expand)	0.162	0.889	0.183	0.329
The key problems facing the Scottish company are how to grow rapidly and how to finance this growth.	0.211	-0.462	0.744	0.465
				Overall = 0.408

[a] Factors extracted using principal-component method (all factors with eigenvalues > 1), then rotated using orthogonal varimax technique.
[b] Respondents were asked to strongly agree (coded 2), agree (coded 1), neutral (coded 0), disagree (coded -1) or strongly disagree (coded -2) with each statement.

Table A 7: Structure matrix of factor loadings: correlations between variables and common factors: Information knowledge methods[a]

Input Variables[b]	Factor 1:	Uniqueness	Kaiser-Meyer-Olkin Measures
Information/knowledge is effectively managed and used throughout the organization	0.823	0.323	0.885
Information/knowledge is held at all levels in the organization	0.803	0.356	0.800
Efforts are made to share information/knowledge across the organization	0.837	0.299	0.844
Lessons learned from daily experiences and projects are captured and disseminated	0.797	0.365	0.805
New information/knowledge is effectively incorporated within the processes and routines within the organization	0.828	0.314	0.848
Information/knowledge about competitors is effectively managed within the organization	0.611	0.626	0.937
			Overall =0.844

[a] Factors extracted using principal-component method (all factors with eigenvalues > 1)
[b] Respondents were asked to strongly agree (coded 2), agree (coded 1), neutral (coded 0), disagree (coded -1) or strongly disagree (coded -2) with each statement.

Table A 8 : Structure matrix of factor loadings: correlations between variables and rotated common factors: Culture [a]

Input Variables[b]	Factor 1:	Uniqueness	Kaiser-Meyer-Olkin Measures
The structure of the organization facilitates change	0.776	0.398	0.640
The organization is not bureaucratic	0.749	0.439	0.673
There is a feeling of openness in this organization	-0.189	0.964	0.398
The culture in this organization promotes change	0.603	0.637	0.688
There is a strong team spirit at all levels of the organisation	0.737	0.457	0.666
			Overall =0.651

[a] Factors extracted using principal-component method (all factors with eigenvalues > 1), then rotated using orthogonal varimax technique.
[b] Respondents were asked to strongly agree (coded 2), agree (coded 1), neutral (coded 0), disagree (coded -1) or strongly disagree (coded -2) with each statement.

Table A 9: Structure matrix of factor loadings: correlations between variables and rotated common factors: Innovation [a]

Input Variables	Factor 1:	Uniqueness	Kaiser-Meyer-Olkin Measures
Acquisition of machinery equipment & software for innovation	0.673	0.547	0.827
Training for innovation activities	0.677	0.541	0.849
R&D that was done by another company outside the enterprise	0.558	0.689	0.847
All forms of Design for innovation activities	0.652	0.575	0.838
R&D that took place within the Scottish enterprise	0.617	0.619	0.842
Purchase of external knowledge for innovation	0.606	0.633	0.853
Spending on the Market introduction of innovations (e.g., advertising, market research)	0.687	0.528	0.840
			Overall =0.842

[a] Factors extracted using principal-component method (all factors with eigenvalues > 1), then rotated using orthogonal varimax technique.

Table A 10: Firm A: Categorical Principal Components Analysis
Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	.918	5.770	57.697
2	.776	3.315	33.147
Total	.989ᵃ	9.084	90.845

a. Total Cronbach's Alpha is based on the total Eigenvalue.
Model has represented most of the information in the grid.

Table A 11: Firm B :Categorical Principal Components Analysis
Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	.901	5.279	52.794
2	.636	2.340	23.400
Total	.965ᵃ	7.619	76.194

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Model has represented most of the information in the grid.

Table A 12: Firm C : Categorical Principal Components Analysis
Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	.988	8.201	91.117
2	-.345	.767	8.522
Total	1.000ᵃ	8.968	99.639

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Model has represented most of the information in the grid.

Table A 13: Firm D: Categorical Principal Components Analysis
Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	.962	7.447	74.471
2	.478	1.755	17.550
Total	.990ᵃ	9.202	92.021

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Model has represented most of the information in the grid.

Table A 14: Firm E : Categorical Principal Components Analysis
Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	.975	6.075	86.785
2	-.152	.884	12.626
Total	.999[a]	6.959	99.410

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Model has represented most of the information in the grid.

Table A 15: Firm F: Categorical Principal Components Analysis
Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	.954	6.048	75.604
2	.471	1.698	21.225
Total	.995[a]	7.746	96.829

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Model has represented most of the information in the grid.

Table A 16: Firm G :Categorical Principal Components Analysis
Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	.858	4.011	50.142
2	.662	2.379	29.740
Total	.964[a]	6.391	79.882

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Model has represented most of the information in the grid.

Table A 17: Firm H : Categorical Principal Components Analysis
Model Summary

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1	.976	4.559	91.176
2	-1.770	.413	8.254
Total	.999[a]	4.972	99.430

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Model has represented most of the information in the grid.

Table A 18: Model 3 (a) Services - Ordered probit

Variables	Coef.	Std. Err.	z	Variables	Coef.	Std. Err.	z
Age of firm							
Close to border**	-0.114	0.052	-2.19	Regions/Domestic market			
No land border***	-0.317	0.085	-3.72	Uk***	0.285	0.111	2.56
Innovation				Germany**	-0.175	0.099	-1.77
Product innovation themselves ***	0.164	0.053	3.07	Romania & Bulgaria***	-0.507	0.104	-4.87
Product innovation new for enterprise *	0.102	0.055	1.86	Benelux***	0.331	0.096	3.46
Technological co-operation***	0.258	0.056	4.60	Partners and Activity abroad			
Subcontracting				Enterprise invested abroad ***	0.310	0.072	4.31
Foreign ***	0.366	0.060	6.14	Industry			
E-commerce ability				Other business activites	0.117	0.079	1.47
No e-commerce ability***	-0.355	0.068	-5.26	Electricity, gas ***	-0.532	0.177	-3.00
Other forms*	-0.490	0.257	-1.91	Wholesale trade **	0.189	0.079	2.41
Orders online**	-0.138	0.056	-2.47	Legal, accounting**	-0.200	0.100	-2.00
Fully e-commerce compatible ***	0.281	0.072	3.89	Retail trade***	-0.322	0.075	-4.31
Public sector support				Real estate activities***	-0.878	0.182	-4.82
Subsidy***	0.411	0.126	3.26	Construction***	-0.497	0.087	-5.71
Employment and labour				Transport travel ***	0.166	0.092	1.80
Natural log of labour productivity ***	0.094	0.020	4.68	Human health activities ***	-0.333	0.128	-2.60
Log of employment***	0.078	0.018	4.39	Hotels ***	-0.670	0.127	-5.29
				R&D	0.179	0.130	1.37
				Imports			
				Imports ***	0.915	0.050	18.30

LR chi2(30) =   1271.51

Log likelihood = -3538.0236

Pseudo R^2=   0.1523

H_0: omitted variables = 0.663

LR chi2(30) =   1271.51

Table A 19: Model 3 (a) services Multinomial logit

Variables	2005 -2008			1999-2004			1994-1998			1985-1993			before 1985		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Innovation															
Product innovation	0.646	0.125	5.18	0.668	0.111	6.01	0.792	0.126	6.29	0.435	0.135	3.23	0.353	0.135	2.62
Technological co-operation	0.546	0.144	3.8	0.477	0.127	3.75	0.323	0.146	2.21	0.533	0.148	3.6	0.546	0.145	3.76
Subcontracting															
Foreign	0.359	0.159	2.25	0.646	0.133	4.88	0.789	0.146	5.4	0.870	0.150	5.8	0.946	0.146	6.48
E-commerce ability															
No e-commerce	-0.323	0.151	-2.14	-0.675	0.153	-4.41	-0.739	0.186	-3.98	-0.651	0.187	-3.49	-0.826	0.201	-4.11
Public sector support															
Subsidy	1.212	0.343	3.54	1.074	0.321	3.35	1.015	0.350	2.9	0.860	0.382	2.25	1.370	0.325	4.21
Partners and Activity abroad															
Invested abroad	0.618	0.194	3.19	0.839	0.162	5.18	0.902	0.179	5.04	0.648	0.198	3.28	1.177	0.173	6.79
Industry															
Human health activities	-1.226	0.397	-3.09	-1.371	0.358	-3.83	-0.771	0.310	-2.48	-0.684	0.310	-2.21	-1.120	0.368	-3.04
Legal, accounting	-0.554	0.254	-2.18	-0.267	0.200	-1.33	-0.847	0.284	-2.98	-0.729	0.284	-2.57	-0.696	0.280	-2.49
Real estate activities	-1.139	0.426	-2.68	-1.419	0.428	-3.32	-1.547	0.520	-2.98	-2.160	0.721	-3	-2.810	1.012	-2.78
Hotels / catering	-1.177	0.309	-3.81	-2.240	0.423	-5.29	-2.004	0.426	-4.7	-1.873	0.426	-4.4	-1.274	0.329	-3.87
Retail trade	-0.214	0.156	-1.37	-0.566	0.150	-3.76	-0.836	0.183	-4.58	-1.080	0.205	-5.28	-0.942	0.197	-4.78
Construction	-0.442	0.191	-2.31	-0.741	0.185	-4.01	-1.137	0.241	-4.71	-1.330	0.264	-5.05	-1.286	0.260	-4.95
Imports															
Imports	1.425	0.124	11.53	1.759	0.115	15.26	1.924	0.137	14.07	1.949	0.143	13.62	2.069	0.146	14.15

LR χ^2 (65) = 2108.14
Log likelihood= -5609.5289
Pseudo R^2= 0.16

Table A 20: Model 3(a) Services: Selectively constrained model

Variables	2005 -2008			1999-2004			1994-1998			1985-1993			before 1985		
	Coef.	Std. Err.	z	Coef.	Std.	z	Coef.	Std.	z	Coef.	Std.	z	Coef.	Std.	z
Age of firm															
Close to border	-0.153	0.085	-1.8	-0.153	0.085	-1.8	-0.153	0.085	-1.8	-0.153	0.085	-1.8	-0.153	0.085	-1.8
Subcontracting															
Foreign subcontractor	0.890	0.095	9.32	0.890	0.095	9.32	0.890	0.095	9.32	0.890	0.095	9.32	0.890	0.095	9.32
E-commerce ability															
No e-commerce	-0.754	0.119	-6.33	-0.754	0.119	-6.33	-0.754	0.119	-6.33	-0.754	0.119	-6.33	-0.754	0.119	-6.33
Fully e-commerce compatible	0.270	0.114	2.38	0.270	0.114	2.38	0.270	0.114	2.38	0.270	0.114	2.38	0.270	0.114	2.38
Public sector support															
Subsidy	0.818	0.207	3.95	0.818	0.207	3.95	0.818	0.207	3.95	0.818	0.207	3.95	0.818	0.207	3.95
Employment and labour															
Log of employment	0.109	0.032	3.47	0.153	0.033	4.65	0.194	0.038	5.14	0.234	0.044	5.32	0.344	0.059	5.81
Natural log of labour productivity	0.124	0.036	3.45	0.189	0.038	4.96	0.266	0.044	6.08	0.308	0.049	6.23	0.519	0.067	7.7
Regions/Domestic market															
Romania & Bulgaria	-0.803	0.179	-4.49	-0.803	0.179	-4.49	-0.803	0.179	-4.49	-0.803	0.179	-4.49	-0.803	0.179	-4.49
Benelux	0.446	0.176	2.53	0.580	0.177	3.28	0.789	0.182	4.34	0.933	0.193	4.84	1.222	0.222	5.52
Industry															
Research and development	0.727	0.213	3.42	0.727	0.213	3.42	0.727	0.213	3.42	0.727	0.213	3.42	0.727	0.213	3.42
Wholesale trade	0.370	0.121	3.06	0.370	0.121	3.06	0.370	0.121	3.06	0.370	0.121	3.06	0.370	0.121	3.06
Construction	-0.747	0.143	-5.21	-0.747	0.143	-5.21	-0.747	0.143	-5.21	-0.747	0.143	-5.21	-0.747	0.143	-5.21
Retail trade	-0.525	0.114	-4.58	-0.525	0.114	-4.58	-0.525	0.114	-4.58	-0.525	0.114	-4.58	-0.525	0.114	-4.58
Imports															
Imports	1.855	0.088	21.12	1.751	0.092	18.95	1.541	0.106	14.55	1.361	0.126	10.83	1.057	0.171	6.18

Wald $\chi^2 (30)$= 934.2

Log likelihood = -3588.6081

Pseudo R^2= 0.142

Table A 21: Model 3(b) Manufacturing Ordered probit

Variables	Coef.	Std. Err.	z	Variables	Coef.	Std. Err.	z
Landborder				Industry			
No land border	-0.241	0.125	-1.94	Metal industry***	0.232	0.080	2.9
I nnovation				Publishing **	-0.230	0.095	-2.42
Product innovation ***	0.206	0.055	3.78	Machinery**	0.211	0.084	2.52
E-commerce ability				Coke products**	0.135	0.088	1.53
No e-commerce ***	-0.369	0.077	-4.77	Textiles***	0.274	0.089	3.07
Public sector support				Imports			
Information ***	0.347	0.160	2.17	Imports ***	0.726	0.061	11.94
Employment and labour							
Log of employment	0.184	0.021	8.61				
Regions/Domestic market							
Uk**	0.405	0.160	2.53				
Germany***	0.366	0.113	3.24				
Benelux***	0.379	0.103	3.69				
Spain***	0.319	0.111	2.88				
Italy***	0.691	0.115	5.99				
Nordic countries***	0.525	0.098	5.37				
Poland*	-0.211	0.109	-1.94				
Romania & Bulgaria ***	-0.321	0.107	-3				
Partners and Activty abroad							
Invested abroad***	0.382	0.088	4.35				

LR χ^2 (20) = 617.59 Log likelihood = -2758.6486 Pseudo R^2 = 0.10 H_0: omitted variables = 0.217

Table A 22: Model 3(b) Manufacturing: Multinomial logit

Variables	2005 -2008			1999-2004			1994-1998			1985-1993			before 1985		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
I nnovation															
Product innovation	0.487	0.180	2.71	0.224	0.157	1.42	0.387	0.165	2.35	0.520	0.171	3.04	0.812	0.163	4.98
Public sector support															
Information	1.075	0.659	1.63	0.832	0.641	1.3	1.248	0.605	2.06	1.302	0.608	2.14	1.446	0.576	2.51
Employment and labour															
Log of employment	0.145	0.068	2.12	0.303	0.061	4.98	0.398	0.066	6.03	0.361	0.068	5.29	0.455	0.066	6.88
Partners and Activty abroad															
Invested abroad	1.008	0.388	2.6	0.777	0.360	2.16	1.194	0.343	3.48	1.434	0.340	4.22	1.743	0.321	5.43
Imports															
Imports	1.123	0.187	5.99	1.530	0.171	8.97	1.781	0.193	9.22	1.898	0.209	9.1	1.469	0.181	8.14

LR χ^2 (30)   =   555.46
Log likelihood= -2754.6833
Pseudo R^2=   0.09

Table A 23: Model 3(b) Manufacturing Selectively constrained model

Variables	2005 -2008			1999-2004			1994-1998			1985-1993			before 1985		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Distance from border															
Medium distance from border	0.285	0.097	2.93	0.285	0.097	2.93	0.285	0.097	2.93	0.285	0.097	2.93	0.285	0.097	2.93
Innovation															
Product innovation inhouse	0.336	0.091	3.68	0.336	0.091	3.68	0.336	0.091	3.68	0.336	0.091	3.68	0.336	0.091	3.68
E-commerce ability															
No e-commerce ability	-0.663	0.129	-5.15	-0.663	0.129	-5.15	-0.663	0.129	-5.15	-0.663	0.129	-5.15	-0.663	0.129	-5.15
Public sector support															
Information to export	0.561	0.262	2.14	0.561	0.262	2.14	0.561	0.262	2.14	0.561	0.262	2.14	0.561	0.262	2.14
Labour productivity/ employment															
Log of employment	0.293	0.037	7.98	0.293	0.037	7.98	0.293	0.037	7.98	0.293	0.037	7.98	0.293	0.037	7.98
Regions/Domestic market															
Romania & bulgaria	-0.581	0.211	-2.75	-0.523	0.204	-2.56	-0.806	0.216	-3.73	-1.376	0.299	-4.61	-1.869	0.516	-3.62
Italy	0.624	0.242	2.58	0.909	0.234	3.88	0.800	0.218	3.67	1.096	0.219	5.01	1.195	0.232	5.16
Partners and Activty abroad															
Enterprise invested abroad	0.807	0.142	5.67	0.807	0.142	5.67	0.807	0.142	5.67	0.807	0.142	5.67	0.807	0.142	5.67
Industry															
Metal industry	0.187	0.126	1.49	0.187	0.126	1.49	0.187	0.126	1.49	0.187	0.126	1.49	0.187	0.126	1.49
Publishing	-0.509	0.155	-3.28	-0.509	0.155	-3.28	-0.509	0.155	-3.28	-0.509	0.155	-3.28	-0.509	0.155	-3.28
Imports															
Imports	1.490	0.115	12.91	1.336	0.114	11.71	1.067	0.122	8.78	0.817	0.137	5.97	0.482	0.168	2.87

LR χ^2 (23) = 521.67
Log likelihood -2757.1714
Pseudo R^2= 0.10

Table A 24: Model 3(c) all sectors Ordered probit

Variables	Coef.	Std. Err.	z	Variables	Coef.	Std. Err.	z
Distance from border							
No land border***	-0.249	0.072	-3.46	Legal, accounting***	-0.579	0.097	-5.96
Innovation				Other business activities***	-0.230	0.077	-2.97
Product innovation themselves ***	0.210	0.039	5.36	Human health activities***	-0.744	0.125	-5.97
Subcontracting				Transport, travel ***	-0.234	0.089	-2.63
Foreign subcontractor***	0.386	0.049	7.92	Hotels / catering***	-1.064	0.121	-8.78
E-commerce ability				Construction***	-0.871	0.084	-10.36
No e-commerce ability***	-0.337	0.053	-6.38	Retail trade***	-0.691	0.072	-9.67
Public sector support				Misc.	0.157	0.113	1.39
Subsidy	0.267	0.087	3.07	Machinery***	0.277	0.097	2.86
Employment and labour				Metal industry***	0.365	0.095	3.83
Natural log of labour productivity***	0.083	0.017	5.00	Coke products** *	0.223	0.105	2.14
Log of employment***	0.111	0.015	7.61	Sale/repair of motor ***	-0.317	0.095	-3.33
Regions/Domestic market				Wholesale trade***	-0.141	0.076	-1.86
Italy***	0.228	0.071	3.21	Textiles***	0.375	0.108	3.48
Romania & bulgaria***	-0.366	0.082	-4.48	Real estate activities***	-1.228	0.172	-7.12
Benelux***	0.411	0.077	5.31	Other service activities***	-0.353	0.098	-3.59
Nordic countries**	0.126	0.060	2.10	Electricity, gas, water ***	-0.864	0.172	-5.01
Uk***	0.273	0.095	2.88	Imports			
Partners and Activty abroad				Imports***	0.857	0.041	20.84
Enterprise invested ***	0.305	0.059	5.19	LR χ² (33) = 2105.70			
Industry				Log likelihood = -5547.861			
Computer and related***	-0.292	0.099	-2.95	Pseudo R² = 0.1595			
Renting of machinery	-0.462	0.133	-3.47	Ho: omitted variables= 0.199			

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Table A 25: Model 3(c) all sectors Multinomial logit

Variables	2005 -2008			1999-2004			1994-1998			1985-1993			before 1985		
	Coef.	Std.	z	Coef.	Std.	z	Coef.	Std.	z	Coef.	Std.	z	Coef.	Std.	z
Innovation															
Product innovationthemselves	0.692	0.101	6.87	0.622	0.089	6.99	0.721	0.098	7.36	0.537	0.102	5.27	0.689	0.097	7.08
Subcontracting															
Foreign subcontractor	0.461	0.132	3.49	0.602	0.112	5.37	0.801	0.118	6.8	0.881	0.120	7.36	0.954	0.114	8.36
Distance from border															
No e-commerce ability	-0.277	0.124	-2.23	-0.558	0.119	-4.7	-0.533	0.137	-3.9	-0.647	0.147	-4.41	-1.113	0.167	-6.65
Public sector support															
Subsidy	0.961	0.277	3.47	1.149	0.239	4.81	1.040	0.253	4.11	1.297	0.246	5.26	1.009	0.250	4.03
Partners and Activty abroad															
Enterprise invested abroad	0.676	0.165	4.11	0.760	0.142	5.36	0.962	0.147	6.55	0.868	0.153	5.65	1.291	0.137	9.43
Industry															
Machinery	0.494	0.298	1.65	0.418	0.264	1.59	1.150	0.235	4.9	1.183	0.236	5.02	0.869	0.245	3.55
metal industry	0.815	0.259	3.15	1.089	0.213	5.11	1.289	0.219	5.88	0.879	0.248	3.54	1.361	0.215	6.32
Human health activities	-1.448	0.392	-3.69	-1.584	0.352	-4.5	-0.983	0.304	-3.23	-0.948	0.305	-3.11	-1.469	0.361	-4.07
Legal, accounting	-0.797	0.248	-3.22	-0.473	0.193	-2.45	-1.062	0.279	-3.81	-0.992	0.279	-3.56	-1.145	0.273	-4.19
Real estate activities	-1.416	0.422	-3.36	-1.691	0.424	-3.99	-1.600	0.467	-3.43	-2.046	0.592	-3.45	-3.316	1.012	-3.28
Hotels / catering	-1.406	0.304	-4.63	-2.479	0.420	-5.91	-2.216	0.423	-5.24	-2.172	0.423	-5.14	-1.708	0.323	-5.28
Retail trade	-0.463	0.145	-3.19	-0.850	0.141	-6.02	-1.107	0.174	-6.35	-1.376	0.197	-6.97	-1.291	0.189	-6.85
Construction	-0.649	0.184	-3.53	-0.960	0.178	-5.4	-1.364	0.236	-5.78	-1.552	0.259	-6	-1.539	0.248	-6.19
Imports															
Imports	1.401	0.102	13.77	1.770	0.094	18.86	1.941	0.110	17.72	1.977	0.114	17.29	1.920	0.109	17.58

LR χ^2 (70) = 3380.32

Log likelihood = -8702.8627

Pseudo R^2= 0.16

Table A 26: Model 3(c) all sectors Selectively constrained model

Variables	2005 -2008			1999-2004			1994-1998			1985-1993			before 1985		
	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Distance from border															
Medium distance	0.303	0.066	4.56	0.303	0.066	4.56	0.303	0.066	4.56	0.303	0.066	4.56	0.303	0.066	4.56
Innovation															
Product innovation	0.643	0.073	8.81	0.608	0.073	8.33	0.504	0.077	6.54	0.377	0.086	4.4	0.327	0.109	2.99
E-commerce ability															
No e-commerce	-0.597	0.092	-6.48	-0.597	0.092	-6.48	-0.597	0.092	-6.48	-0.597	0.092	-6.48	-0.597	0.092	-6.48
Fully e-commerce	0.193	0.093	2.07	0.193	0.093	2.07	0.193	0.093	2.07	0.193	0.093	2.07	0.193	0.093	2.07
Employment and labour															
Natural log of labour productivity	0.105	0.03	3.54	0.158	0.031	5.17	0.223	0.033	6.67	0.288	0.036	7.92	0.469	0.05	9.42
Log of employment	0.155	0.027	5.81	0.199	0.027	7.29	0.231	0.03	7.69	0.274	0.034	8.11	0.357	0.044	8.12
Regions/Domestic market															
Romania & bulgaria	-0.642	0.15	-4.3	-0.868	0.16	-5.41	-0.836	0.186	-4.5	-1.187	0.257	-4.62	-2.481	0.713	-3.48
Benelux	0.345	0.148	2.33	0.496	0.147	3.38	0.684	0.146	4.67	0.818	0.15	5.46	1.071	0.165	6.48
Partners and Activty abroad															
Enterprise invested	0.883	0.125	7.07	0.726	0.117	6.19	0.617	0.114	5.4	0.344	0.121	2.84	0.356	0.143	2.48
Industry															
Machinery	1.511	0.234	6.47	1.361	0.212	6.43	1.355	0.191	7.11	0.876	0.183	4.78	0.489	0.228	2.15
Metal industry	1.495	0.214	6.99	1.361	0.198	6.89	0.927	0.178	5.21	0.696	0.182	3.82	0.89	0.202	4.39
Retail trade	-0.788	0.105	-7.5	-0.788	0.105	-7.5	-0.788	0.105	-7.5	-0.788	0.105	-7.5	-0.788	0.105	-7.5
Imports															
Imports	1.878	0.071	26.51	1.742	0.073	23.81	1.531	0.082	18.58	1.311	0.095	13.86	1.033	0.125	8.29

Pseudo R^2 = 0.16

LR χ^2 (53) = 1541.07   Log likelihood = -5588.2898

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