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Dynamics of Small Business Internationalisation

A European panel study

Per-Anders Havnes

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Author	Per-Anders Havnes
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In memory of

Professor Michael G. Scott

With gratitude for being allowed to share his wisdom and reflections.

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Per-Anders Havnes

Preface to this edition

The content of this edition is identical to the version that was originally submitted to University of Stirling for the Degree of Doctor of Philosophy in 1998 and finally approved in 1999.

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Per-Anders Havnes

ABSTRACT

Internationalisation has become part of the daily life of most small and medium sized enterprises (SME) in Europe. The internationalisation of enterprises is a dynamic phenomenon and is in this thesis studied as one specific example of change processes in the development of SMEs.

Previous research on internationalisation has largely been explorative, most often without any modelling of causal relationships, and with insufficient definitions of concepts. The dominating dynamic models have been based on the assumption of uni-directional changes in small steps, and only cross sectional data have been used.

The present research is one of the first where longitudinal date is available for studying the process of internationalisation. The data comes from a panel consisting of 1700 SMEs from 7 countries in Europe where each firm is observed 4 or 5 times in the period 1991-95. Around 47% of the enterprises in the panel exhibit development of their export quota which can be explained by an incremental change model. Importantly, an almost equally large proportion, 45% of the enterprises, exhibit fluctuations in their export quota which cannot be explained by the incremental change models. Although variations have been found, the non-incremental change patterns are significantly represented in all countries, all size classes of enterprises and in all industry sectors; and can therefore be considered to be general features -- not patterns associated with specific sub groups of enterprises.

The causal analyses of factors influencing export orientation were not able to identify a temporally stable regression model for export quota. The endogenous variable market extension has been found to be influenced by four composite measures: external interaction (+), available capacity (-), employment (+), and manager capabilities (+).

Measured by growth in total sale, there is clear evidence that the non-regular change patterns of export quotas cannot be regarded as indicators of failure. On the contrary, the results suggest that the non-regular change patterns identify enterprises which successfully use adaptation and flexibility to their competitive advantage.

An initial model was built on previous research where conceptualisation and relationships have mainly been tested with cross-sectional data. This model did not stand up to a test with longitudinal data. The discrepancy between cross sectional and longitudinal modelling indicates that there is a qualitative difference in what can be deduced from research based on one observation and multiple observations. The same conclusion can be derived from the fact that factor analyses as well as path analyses produced different results when the yearly data sets were analysed separately or concurrently.

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1 Introduction

1.1 The main issues of the research

In a lecture on research strategy, the Norwegian Nobel Price Laureate in economics, Professor Trygve Haavelmo, once used a metaphor from forestry, urging his students to do more coarse logging and not concentrate their efforts solely on trimming[1]. The metaphor is very appropriate for the present research setting. A large number of variables and the fact that the research leads into unmapped 'terrain' necessitate that the first step should be to explore the general structural features of the data. Once these are mapped, they provide a solid basis for further research when analysing the finer details.

1.1.1 Dynamics and change processes

The main challenge of this research endeavour is to explore the dynamics of business development. A significant part of the dynamic picture is caused by businesses adapting to random changes in their environment, and random fluctuation of their own performance. But there is also another part of the dynamic picture which is the result of an intentional or unintentional development through change processes. Some observers prefer to depict change processes in enterprises by drawing analogies to life forms. With such metaphors the notion of small businesses as enterprises that are not yet 'grown up' springs easily to mind. Small and medium-sized enterprises (SMEs) are seen as early stages of a life cycle. Other observers maintain that the change processes in enterprises have unique characteristics and follow different paths of development than any other development process. It is therefore not possible to conclude from models of life processes as to the 'normal' pattern of the development of enterprises.

No matter which perspective is chosen, the exploration of enterprise development must start by mapping the actual sequence of change. This must be the basis for gaining insight into the mechanisms that control the functioning of enterprises. The endeavour must include a model of the dynamic characteristics of change as well as the factors and mechanisms of the dynamic process. A main challenge is to distinguish between factors of a random na-

[1] Communicated to the author by one of the attending students.

ture and factors that are part of a sustained development process. Internationalisation and exporting

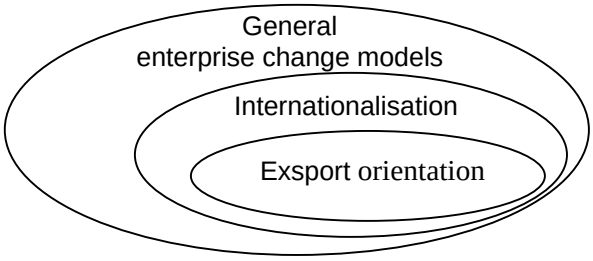
In literature on this subject the concept *internationalisation* has two different interpretations. One relates to the process of changing the focus of the enterprise from domestic to cross border venues or activities (i.a. Welch and Luostarinen, 1988). The second relates to the outcome of this process, it is a measure of the degree of international orientation of the enterprise (i.a. OECD, 1996). For both of these approaches, however, understanding depends on the ability to identify, measure and analyse the factors which precipitate and sustain the process and therefore influence the outcome.

It may be argued that internationalisation as a phenomenon is not much different and not more interesting than expansion from a local market to the distant parts of a domestic market. In both cases the enterprise must adopt new methods for obtaining information and distributing products. However, when crossing borders enterprises have to adapt to new cultural, linguistic and legal environments, which adds a new dimension to the process compared to a purely domestic expansion. Studying internationalisation therefore provides insight into a number of phenomena related to qualitative adaptation of enterprises, not merely quantitative extensions and reorientation. The qualitative aspects are not apparent if the cross border dimension is excluded.

Internationalisation is one of many modes of transformation or change in an enterprise. The internationalisation process will always be externally oriented with internal implications. This is opposed to other types of transformation processes like organisational development or adaptation of new production technology, which are examples of internally oriented change processes with external implications. Improved understanding of the internationalisation process will therefore also contribute to better understanding of general change processes in SMEs.

Trading is the most commonly found form of internationalisation for manufacturing SMEs (OECD, 1996; ENSR, 1996; Haahti, 1993), and very often the ultimate objective of other forms of internationalisation (ENSR, 1996). Exporting is also the form of internationalisation which is most easily and most widely documented (Miesenbock, 1988; Leonidou and Katsakis, 1996). It is therefore both relevant and meaningful to use exporting as a proxy for internationalisation, and to approach internationalisation within the general framework of change in enterprises, see Figure 1.1.

Figure 1.1 Export oreientation process in a hierarchy of change models



1.1.2 The small business perspective

Over the past few years an increasing number of European small and medium-sized enterprises (SMEs) have become internationally oriented in their trading and operational activities. However, most of the literature on internationalisation, educational as well as research oriented, is based on experiences from large or very large enterprises. For many purposes the options and problems of internationalisation are the same for SMEs and large firms. But, by definition SMEs will always control smaller resources and smaller information networks, and have less specialisation of internal competence. A small firm will also have less opportunity for foreign placements of key personnel for control purposes than large enterprises. These arguments are not sufficient to establish that the internationalisation process of SMEs is different from that of large enterprises. But they clearly indicate that there is no reason to assume *a priori* that the same processes and the same mechanisms of development are active in small and large enterprises.

Introducing the small business perspective into the research implies recognition of the fact that the size of the enterprises may be an important explanatory variable, and that there may be modes of operation which are typical for small business.

1.2 Relevance of the research topic

The basic purpose of the present research is to examine and analyse the development process of enterprises. As such, the project has general relevance to the theory of firm development. However, since the development process to be studied is exporting as one manifestation of internationalisation, the results will also be of relevance to practitioners in the business world, involved in one of the growing number of enterprises that are somehow engaged in internationalisation and exporting.

In a world where the international aspect of business transactions is also becoming a topic of growing interest to politicians and governments, the results of the research will also have relevance for policy making and supportive measures at government levels.

1.3 The presentation in the thesis

Any research report is a description of an analytic tool, and as such a perspective utilised to model and interpret a section of reality. The model gives structure to information provided by empirical data by enhancing some and subduing other features. In this research process patterns which facilitate interpretations of underlying processes and structures become visible. The validity of such interpretations depends on our understanding the intrinsic properties of the model as well as our knowing which part of reality is represented by the empirical data.

There is always a strong interaction between the research model and the research subject throughout the research process. The initial research model is based on assumptions concerning the phenomena to be studied. As the research progresses, insight into the phenomena is improved, which encourages adjustments to and improvements in the research model. This has also been the case for the present research endeavour. In order to enhance understanding of the model and thereby interpretations of the research results, the logical development of the research model is to a certain extent traced in Chapter 3, literature review, and Chapter 4, operational framework.

The literature review includes in Appendix 2 tabulated summaries of review articles and publications of empirical research on exporting. These selected publications cover a period of three decades and provide an interesting illustration of the slow progress in this academic field. Similar models, proposals for further research, and criticism are found throughout the period. This can partly be attributed to the practical restrictions on establishing data sets that allow studies of phenomena across cultures and over a sufficiently long period of time.

The work on this thesis started with the notion that the objective must be to contribute to an understanding of the phenomenon of internationalisation by verifying or refuting the correlation between internationalisation and a number of potentially influencing factors. As the work progressed, the notion of 'patterns' became more and more essential to the depiction and interpretation of the internationalisation process. These patterns can be perceived in many dimensions. There are patterns over time, where the development of enterprises or factors displays similar temporal fluctuations, process patterns. There are also patterns of which factors or parameters interact, structural patterns, which are more or less stable over time. Finally, there are also patterns which are observable only when the observation is made along the dimension of enterprises, structural patterns. Adding to the understanding of the importance of such patterns became an important objective as the work with the thesis progressed. The process patterns will typically be studied with output oriented research models. The structural patterns will typically be studied with mechanism oriented research models. As will be discussed later, the first approach has been selected for this study.

The empirical data used here is far more extensive in the number of cases and the period of observation is much longer than what is normally available in small business research. This has been possible through international co-operation in the Interstratos project. A description of this project as well as a description of the data set is provided in Chapter 5 and Appendix 1.

In line with the ambition of mapping the main structures and features, most detailed descriptions and analyses have been presented in appendices. The main body of the text focuses on the principal elements and conclusions with frequent references to the appropriate sections of the appendices.

2 Research objective

2.1 Change models

One important aspect of business studies has always been to be able to explain how enterprises change, and what factors influence this change. Some extreme views of the associated development process hold the process as being deliberate and systematic, improvised and random, or as being cyclic, pre-programmed and similar to biological life processes. These views all represent models of the mechanisms of development and the manifestation of the resulting changes.

Since the word 'development' linguistically is often associated with deliberate and positive changes, the terms 'change process' and 'change model' will be used in the present context. A change model is here seen as the model of the factors and the mechanisms that lead to changes of enterprises, including the manifestation of the change as measured by performance and stage measurements. The theoretical aspects of change models will be further deliberated in Section 3.4.

To reduce the enormous complexity of studying change models at the level of the total enterprises, changes can be studied at sub-system level. One such sub-system can be defined as the interaction of the enterprise with its environment, and especially that part of the interaction that crosses borders. Changes of this sub-system, one optional definition of the internationalisation process, will lead to changes also in other sub-systems. Therefore increased knowledge on the change processes related to internationalisation will also contribute to increased knowledge on the change processes of enterprises in general.

2.2 Domination of gradual change models

A substantial number of models or perspectives have been proposed to describe the various aspects of transformation or change in the internationalisation of enterprises. Examples of such are network models (Johannisson, 1995; Joyce *et al*, 1995), learning models (Haveman, 1993), resource based models (Ahokangas, 1995; Nielsen, 1994) , the 'eclectic model' (Dunning, 1988, 1993), stages model of exporting (i.a. Turnbull, 1987), the Uppsala model of internationalisation (Johanson and Vahlne, 1977 and 1990), and life cycle models (Brezis *et al.*, 1993; Hanks *et al.*, 1993). These models are discussed in detail in Chapter 3, where we shall see that they all are, mostly

implicitly, based on an assumption of incremental and continuous change. The notions of incremental and continuous change are characteristic for life cycle models as well as models based on deliberate and systematic mechanisms.

The enterprises are assumed to:

- evolve from a low to a high degree or measure of activity, resources or commitment
- in small or large steps
- which are all assumed to be uni-directional.

In this respect these models are normative. When incremental growth is assumed to be the normal pattern of change, decreasing number of employees, decreasing sales or decreasing exports are, by definition, not normal and are taken as indicators of malfunctioning or failure.

In real life, however, one often finds enterprises which do not conform with an assumption of incremental change. Enterprises may export one year, not export the second and come back to exporting the third year. Likewise, total turnover or employment may fluctuate independently or in consort. To some enterprises such fluctuations or irregularities are normal patters of temporal change in activities. To other enterprises or at other times (under other conditions) stability, incremental growth or even (temporary) decline may be normal patterns of change. One major criticism of the stages models has therefore been the implicit assumption that the enterprise progresses in a unilinear fashion through the stages (Strandskov, 1985; Turnbull, 1987; Leonidou and Katsikeas, 1995: 636).

Any model which is based upon incremental development may not recognise that there are different patterns of temporal change, and thus lose sight of or neglect information pertaining to other change patterns.

2.3 Initial questions

The stimuli to start exporting may be internal and related to different factors such as excess capacity, uniqueness of the product, the personal interests and competence of the decision maker, etc. The stimuli may also be external such as a saturated home market, better prices in export markets, etc. But the most common external stimulus is the unsolicited order, indicating that the initiation of exporting was an unplanned event. For the smallest firms, external stimuli for starting exporting are more commonly found than internal stimuli (Miesenbock, 1988: 45) suggesting a reactive pattern. Miesen-

bock in his literature review (*op cit.*: 44) found that very commonly studies on export development suggest that enterprises proceed through several stages before being established as an experienced and stable exporter. Although challenged (Strandskov, 1985; Turnbull, 1987; Andersen, 1993; Leonidou and Katsikeas, 1996) this notion of development through stages is still used and supported by contemporary authors (Rao and Naidu, 1992; Chetty and Hamilton, 1996; Christensen and Jacobsen, 1996; Gankema *et al*, 1996). But, what happens to the enterprise that never proceeds through these stages but continues to receive export orders irregularly? What are the factors in the surroundings of the enterprise that influence the transition from irregular to regular exporter? Are the intermittent exporters more or less successful, by other measures, than the stable exporter?

This range of questions outlines the research objective, which has four major aspects:

1. to confirm the existence of other change patterns than incremental growth,
2. to analyse the relationship between export regularity and the size of the firm,
3. to identify external factors that influence export regularity, and to analyse the relationship between these factors and export regularity, and
4. to analyse how export regularity influences enterprise performance.

Underlying this objective is the assumption that small enterprises may successfully pursue a strategy that exploits flexibility in lieu of persistence. The manifestation of flexibility will be that exporting is irregular or intermittent; the manifestation of persistence will be that exporting is stable or increasing.

The research objective can be further specified by the following questions:

- What categories of change patterns can be found for exporting, and how frequently are the different patterns found?
- Which are the internal and external factors that characterise the irregular and intermittent exporters?
- Specifically, is it so that the smallest firms exploit their flexibility by persisting as irregular or intermittent exporters? If yes, is there a critical enterprise size where it is advantageous to go from intermittent to irregular and subsequently stable exporting?
- Are the irregular and intermittent exporters more or less successful by other measures, such as growth in total sales, than the stable exporters?

Although the research objective focuses on export behaviour, answers to the above questions will also contribute to a further understanding of the internationalisation process of SMEs, and to a further understanding of general change mechanisms in SMEs.

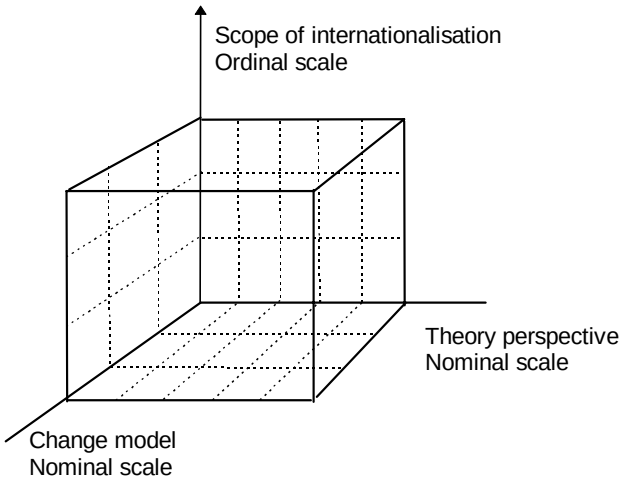
3 Previous research

The most frequent and persistent criticism of the research on SMEs and internationalisation is the lack of a common conceptual framework (Bilkey, 1978:33; Reid, 1981:101-2; Miesenbock, 1988:42; Aaby and Slater, 1989:7; Andersen, 1993:209; Leonidou, 1995:133; Leonidou and Katsikeas, 1996:542; Li and Cavusgil, 1996:271). One reason for this is that a large proportion of the empirical research has been and still is explorative, Aaby and Slater (1989:23), Gemünden (1991:48), Leonidou (1995a:150) and Appendix 2 Table 2.2. One consequence of the lacking common framework is that there are very few and inadequately defined lines of research which the present research can be related to. The only option for circumventing this problem is to be exceedingly precise when defining the context of any research contribution in this field.

The previous research on SME and internationalisation will be discussed within a reference system with three main dimensions: The first dimension is the *scope of international operation*[2] including mode, trade flow, organisational structures and strategies (the venue of change). The second dimension is the *theoretical perspective*; such as network, resource base, transaction, learning, innovation, etc., (the mechanisms of change). The third dimension relates to the *change model* of the international focus of the enterprise (the pattern of change). These dimensions are interrelated, in the sense that some combinations of scope, theory perspective, and change model should be expected to be more or less frequent than other combinations. Failure to acknowledge and take these dimensions into account in the research model will unavoidably reduce the transparency of the research model and thus impair the validity of conclusions from the research. As will be demonstrated later, much of the empirical research on internationalisation suffers from lack of precision in these matters.

[2] A very similar concept was denoted by the term 'aspect of international operation' by Calof and Beamish, (1995:117)

Figure 3.1 Three dimensions for discussing research on internationalisation



3.1 The size of the enterprise and internationalisation

However, before turning to these three dimensions, it is important to address two central concepts of this study: that of the size of the enterprise and that of the internationalisation process.

3.1.1 Small and medium sized enterprises

There is an ongoing discussion on the status of SME research as an independent discipline or as a sub-section of the more general discipline of business research[3]. The content of this discussion boils down to two main issues. First of all, is there really any significance difference in how small and large enterprises conduct business? If so, what is 'small' in a business context? Secondly, provided that there is a difference between large and small business, is there also sufficient difference in research methodology to distinguish SME research as a separate field of research?

[3] Personal notes of author from discussions at 8th Nordic Conference of Small Business Research, Halmstad, 1994, 41st ICSB World Conference, Stockholm, 1996, and Rencontre de St. Gall, Gottlieben, 1996.

The size of the enterprise has been an important parameter in numerous studies without providing the conclusive answer as to the relationship between size and exporting or internationalisation (Bilkey, 1978; Miesenbock, 1988; Gemünden, 1991; Leonidou, 1995a). The fact that we have this ongoing discussion is by itself sufficient reason to include size as an important parameter in research on internationalisation of business. It is important to establish if, to what extent, and in case how, size influences the process. But the discussion is also a reminder of paying attention to the definition of the concept of size.

A wide variety of indicators have been used to measure the size of enterprises. Storey (1994: xvi) refers to 16 different British research reports, using 15 different definitions of 'small enterprise'. The complexity of the definitions varies greatly. At one end we find the multi-dimensional and comprehensive, but ambiguous definition(s), used in the Bolton report (*op.cit.*: 9). This authoritative report used one 'economic' definition of size based on market position, management and ownership; and one 'statistical' definition based alternatively on employment, turnover, size of production assets, or ownership of the enterprise. At the other end we find the one dimensional and precise criterion based on employment (SMEs have less than 250 employees), used in *The European Observatory for SMEs* (ENSR, 1996), ignoring the fact that there are obvious differences between industry sectors as to what is commonly regarded as a 'small' or 'medium-sized' enterprise.

The multitude of definitions reflect the different contexts in which the definitions are used (Spilling, 1996: 7), but also that very few authors have paid attention to the need of standardisation of concept for the sake of validation of results, and of building on former research (Leonidou and Katsikeas, 1996: 518).

One final, and important aspect of the size measure is highlighted by both Storey (1994) and Spilling (1996). Irrespective of how the size measure is conceptualised, the majority of the number of enterprises in Europe (85% to 99.5% according to definition) belong to the category 'small and medium sized'. These enterprises account for one-third to one-half of the total employment in the private sector in Europe, depending on the size criteria used. With this high number of SMEs, totally and relatively, it is hardly surprising that they constitute a very heterogeneous group. Even before starting an analysis, it is therefore quite clear that size alone cannot explain all possible variations in patterns and performance. Size effects must always be evaluated in conjunction with other factors such as total available resources (Walters and Samiee, 1990), available information (Cafferata and Mensi, 1995), decision mechanisms (Walters and Samiee, 1990), co-operation (Kaufmann, 1995) and managerial characteristics (Manchini and Prince, 1993).

3.1.2 Internationalisation and exporting

Business has been international for millenniums, but internationalisation of business as a research topic counts its age in decades, as is also pointed out by Thomas and Araujo (1986:138). There is no consensus as to one definition of internationalisation of a firm, but two main groups of definitions can be found, one process oriented and one result oriented, see 3.4.1. Welch and Luostarinen (1988:156) encompass most of the process oriented definitions by saying that internationalisation is «the process of increasing involvement in international operations». One recent approach to definition (Calof and Beamish, 1995:116) takes conceptualisation one step further by defining internationalisation as «the process of adapting firms' operations (strategy, structure, resource, etc.) to international environments». The first important difference is that this definition more explicitly includes domestic adaptations necessitated by increasing competition and opportunities increasing international trade. Secondly, this definition recognises that the internationalisation process may result in retraction as well as expansion with respect to international operation.

The result oriented definitions focus on a measure or degree of internationalisation (ENSR, 1996; Havnes, 1996c; OECD, 1996) along three main dimensions:

a) the proportion of inputs and outputs that are traded across national borders,

b) the proportion of establishments or affiliations in foreign countries, and

c) the geographic range and distance of markets and competition.

For both classes of definitions the number of cross border relationships as well as their strength are vital indicators (Johanson and Matson, 1988:309; Christensen, 1991:61; Welch, 1992).

Among the rapidly increasing literature on SMEs, we also find authors addressing topics related to the roles and positions of SMEs in the increasingly open world economy (i.a. Bonaccorsi, 1992; Christensen, 1991; ENSR, 1996; Haahti, 1993; Hyvärinen, 1992; Miesenbock, 1988; Walters and Samiee, 1990; Westhead, 1995; Leonidou and Katsikeas, 1996). Measured by the number of articles, exporting is the facet of internationalisation that has received most attention, see also Appendix 2. This research on SME and internationalisation has been characterised as fragmented and only to a limited degree cumulative (Leonidou and Katsikeas, 1996; Li and Cavusgil,

1995). On the one hand, this is a clear weakness in this stream of research. But, on the other hand, this also represents a clear strength since several perspectives and models are brought in from other fields of research providing other forms of insight than those provided by main stream perspectives alone, see Section 3.2.

3.2 Theory perspectives

3.2.1 Perspectives and internationalisation models

With the multitude of approaches to research on internationalisation and on SMEs, there is no single theory that has received universal acceptance (Aaby and Slater, 1989:7). Rather, there are a number of theoretical approaches that may be relevant for our topic. In most cases such models are incompatible in structure, level of analysis and/or conceptualisation. However, they all shed light on a section of our problem (Bilkey, 1978). The purpose of this section is to present those theoretical contributions that have direct influence on the research model which will be presented in Chapter 4.

There are three main theory perspectives, which may be used as a basis for modelling internationalisation; the market perspective, the firm perspective and the entrepreneur perspective, see Figure 3.2(a).

The *entrepreneur perspective* focuses on the role and the importance of the manager as change agent of the firm. This role encompasses the motivation for change, the driving force of the change process, as well as the capacity to introduce innovations. Very little of the entrepreneur literature addresses internationalisation, although examples can be found, e.g. Cavusgil and Naor (1987), Bamberger and Weir (1990), Holtzmüller and Kasper (1990). A section of the entrepreneur literature specifically points to the dominant role of managers when it comes to growth, development or change of SMEs, e.g. Davidsson (1989).

The *market perspective* explores relationships with competitors, suppliers and customers and focuses on some of the main elements of the firm as an open system. The market perspective is the realm of the economists. Some of the major, modern contributors move this perspective towards the firm perspective by introducing the concept of strategy.

The *firm perspective* seeks explanations based on the properties and processes of the firm. The firm perspective draws on very different disciplines of theory, including e.g. organisation theory, control theory, network theory, re-

source-based theory, transaction cost theory, general theory on change in enterprises, etc.

The firm perspective will be the starting point for modelling in this study. However, potentially personal influence, especially from the owner manager, increases with decreasing size of the firm. The model must therefore consider the effects of the personal qualifications of the manager. Since internationalisation is one manifestation of the effects of the firm's interactions in the markets, the model must also consider the effects of the market. Elements of theories based on the market perspective and the entrepreneur perspectives will therefore be included in the model building based on the firm perspective, see Figure 3.2(b).

We will briefly present and discuss some central models, which are representative of major approaches within these outlined perspectives.

3.2.2 The market perspective

The market perspective had very early influence on the direction of the research on the internationalisation of enterprises. Two central, yet different, approaches have conceptual frameworks, which are important for understanding SME internationalisation.

Competitive Advantage.

The traditional economists' approach to internationalisation of trade, financing and production is typically market oriented. Due to differences in resource endowment or factor productivity, firms in different countries are assumed to gain competitive advantage as suppliers of certain products or services. As consumers are assumed consistently to seek the cheapest supplier, international trade is the inevitable result (Thomas and Araujo, 1986). The traditional economic approach is deterministic: abundance in resources or high labour productivity in one country will automatically give competitive advantage to the firms of that country, which again will be the basis for export. However, experience shows that factor endowment and productivity alone are insufficient explanations for patterns of world trade (Porter 1990: 12), and therefore also insufficient for explaining competitive advantages of industries or firms in specific countries.

Deterministic theories are insufficient because "...firms can and do choose strategies that differ." (ibid.: 19). Among the factors that determine these strategies are rivalry and interaction with competitors. Porter observes that successful firms and industries are not evenly geographically distributed within areas with seemingly identical factor endowments. Successful indus-

tries are found where there are clusters of firms which are linked horizontally or vertically. International competitive advantage is often achieved through aggressive domestic competition (ibid.: 151). For this reason we find countries or even regions within countries with industry sectors, which are highly competitive internationally, while other industries, or regions are not competitive, although external conditions appear to be similar.

The focus of interest for the line of research epitomised by Porter is why "...firms based in particular nations achieve international success in distinct segments and industries.." (ibid.: 18). The purpose is not primarily to explain the process, merely to explain factors influencing the process and the results, measured at national or industry level. When Porter discusses stages of competitive development, he refers to the competitive position of nations: "...the stages are an effort to highlight those attributes of a nation's industry most important to rising economic prosperity." (ibid.: 545)

For firms which operate internationally, some of the factors which influence competitive advantage are specific to the location of firms, e.g. government programmes, industrial clusters, resource endowments. Other factors are system-based, such as economy of scale, trans-national transfer of knowledge, and the ability to co-ordinate across borders (ibid.: 60). Porter establishes the relationships between these factors and measures of success for nations, regions and/or industries.

Porter's contributions to understanding the mechanisms that influence international competitiveness is significant. His conceptualisation of strategy and comparative advantage is a merger of the market and the firm perspectives, with the market perspective as the dominating influence. However, it is important to emphasise that multinational companies and large-scale industries dominate his empirical data. His conclusions are therefore not necessarily applicable for firms or clusters of firms which are small domestically and/or internationally.

The Eclectic Paradigm

Dunning's 'eclectic paradigm' (Dunning 1988, 1993) addresses one specific aspect of internationalisation, that of foreign production. Dunning addresses the problems of how multi-national enterprises (MNEs) exploit ownership (O) and location (L) advantages by internalising (I) markets rather than using the traditional international markets. The eclectic paradigm predicts that the MNE will establish production where it can best exploit its advantages, as defined by the OLI parameters. This exploitation is only possible because of market imperfections. It is recognised that the firm may have other objectives than profit (Dunning, 1993: 55).

In its latest version, the model is given dynamic properties by introducing two mechanisms; interaction with other operators in the markets, and time lag between implementation of a strategic change and manifestation of the results (ibid.: 53). The dynamic element implies that the configuration of international production in the future is an accumulative function of strategic responses to past OLI configurations and past changes in environment and non-strategic endogenous variables. This is one way of expressing an incremental change process in firms.

Dunning gives three reasons for this process not being deterministic. Firstly, firms can choose among a variety of strategic choices, which cannot be ranked due to incomplete information (ibid.: 56). Secondly, firms will choose their response in accordance with other variables than the strategic OLI parameters (ibid.: 94). Thirdly, it is necessary to distinguish between capability and willingness of MNEs to internalise markets (Dunning, 1988:3). Therefore, in spite of Dunning's claim that the eclectic paradigm has predictive power, the assumed responses of individual firms will inevitably appear to be stochastic to an outside observer. Predictive power can, at best, be expected for aggregated observations of a large number of similar firms.

One more observation should be made as to the intrinsic properties of the eclectic model. The model implies a rational behaviour by the firms which can only be achieved with instant and complete information, unlimited information processing capacity and perfect qualification for evaluating information. This can never be found in reality, but can best be approximated in large and experienced firms. The eclectic paradigm can therefore be expected to be better suited for explaining foreign production of large firms than for small firms, and better suited for experienced firms than for firms starting their international activities.

3.2.3 The firm perspective

The firm perspective focuses partly on the properties of the firm, partly on the mechanisms for adaptation of the firm to its environment. The theories of strategy are generally applied to describe this adaptation, especially when it is premeditated and preplanned. However, for the management of SMEs the notion of strategic *awareness* may be more appropriate than strategic *planning* (Gibb and Scott, 1986).

Here the adaptation to the environment will be discussed in the context of internationalisation. Review articles invariably point to the lack of theory foundation in current research on SMEs and internationalisation. The same deficiency was also frequently found in the review of 39 recent publications

on empirical studies related to exporting or internationalisation. See Appendix 2.

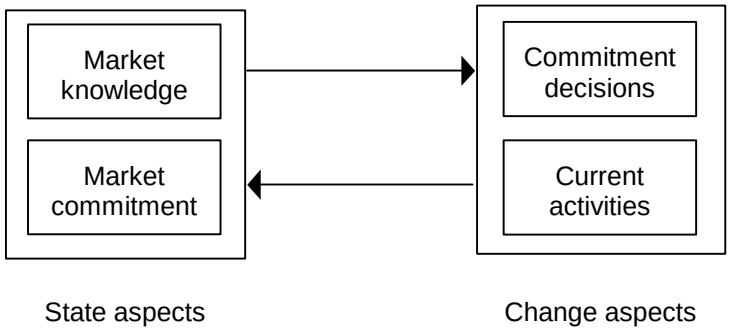
The Uppsala Model

An early and very influential model is often referred to as 'the Uppsala Model'. This model was originally presented by Johanson and Vahlne (1977) and later expanded and modified (Johanson and Vahlne, 1990). One basis of their model is behavioural theory, another is resource-based theory. The internationalisation process is seen as "...an interplay between the development of knowledge about foreign markets and operations on the one hand and an increasing commitment of resources to foreign markets on the other" (Johanson and Vahlne, 1990: 11). According to the authors, the process aspect of the model is based on traditional microeconomics and marketing theory. In this respect the Uppsala Model can be seen as a multidisciplinary model.

As opposed to Porter's model of competitive advantage, the Uppsala model is an attempt to explain the development of individual firms. It describes mechanisms for and predicts patterns of development of the firm, not the competitive position of industries or nations.

The dynamics of the model is achieved by the 'state aspects' - market knowledge and market commitment - affecting the 'change aspects' - commitment decisions and current activities - and vice versa, see Figure 3.3. The cyclic

Figure 3.2 The Uppsala model of the internationalisation process of the firm[4]



aspect implies that internationalisation, with a few exceptions, will be in small steps. This property of the model can be used to explain two different patterns of internationalisation. The first is that firms successively increase their commitment to internationalisation, which addresses the dimension of 'aspects of internationalisation'. The firm starts with no export. Then it commences exporting through independent representatives, followed by sales subsidiaries and finally it may end up by manufacturing abroad.

The second pattern of internationalisation explained by the Uppsala model is that firms enter new markets at successively greater 'psychic distance'. Psychic distance is a complex concept with elements such as language, culture, political system, legal system, etc. (Hallén and Wiedersheim-Paul, 1979). The firm is assumed to start internationalisation in a country where many of these elements are familiar. Progressively it will search for opportunities in more unfamiliar markets, based on experience from familiar markets.

One important aspect which is illustrated by the Uppsala model is that internationalisation most often is related to manufacturing and sales activities of the enterprises. Importing is very seldom regarded as a significant part of the internationalisation process. This can be directly attributed to the dominance in empirical studies of manufacturing sectors (cf. Appendix 2) where the importance of procurement is very often not recognised.

The size dimension is not part of the Uppsala model. However, the empirical basis for the model was the internationalisation process of four large manufacturing corporations.

Innovation-Related Models

Andersen (1993:212) points to another group of models, where the theory perspective is strongly linked to the change model dimension through the notion of stages of internationalisation. He delimit these models by stressing their emphasis on innovation, and thus uses the term innovation-related models.

The similarity with the Uppsala model lies in the notion of increasing knowledge of foreign markets and increasing commitment to internationalisation. Cavusgil (1984:54) ties this to a pattern of three stages of internationalisation - experimental, active and committed. The last stage often includes foreign investments. In earlier works Cavusgil used other definition of stages and also included two pre-exporting stages (Cavusgil, 1980, 1982). Bilkey and Tesar use six levels of export involvement as their definition of

[4] Johanson and Vahlne (1990:12)

stages of internationalisation, while Czinkota and Johnston define six stages based on firm experience, and Reid (1981:103) define five stages.

One serious problem of all of these innovation-adaptation models is that they are all strongly linked to the 'stages models' for the change mode dimension. This mean that they suffer from an inherent difficulty of operationalising, and thus measuring, the stages, see Section 3.4.

Industrial Networks

The term 'industrial network' is used here to delimit networks between firms and/or persons within the business world from all other types of networks. The industrial networks are the inter-firm structures through which business transactions are performed, facilitated and/or supported. As pointed out by Mønsted (1995:207) the dynamics of the network is often equally as important as structural elements for understanding the network.

Industrial networks can be seen as part of the market perspective, focusing on the relationships between the firm and the other participants in the market. Some network relationships can also be interpreted as externalisation of the firm's activities, where it extends and develops beyond its intrinsic resources. The latter types of networks build on a firm perspective. In line with Figure 3.2(b) it seems fruitful to regard the network models as a tool for integrating the market perspective and the firm perspective.

The industrial network models point to the importance of interaction between firms. Several types of relationships can be delineated. A basic distinction can be drawn between the formalised links established through contractual business agreements (including purchasing and sale) on the one hand, and informal links with non-committed exchange of information, advice, suggestion, etc. on the other hand (Courlet and Pecqueur, 1991:60; Johanson and Mattson, 1988:305 ff.). To SMEs, with limited resources which can be dedicated to specific tasks and limited capacity for market intelligence, networks can replace internal resources and capacities of large firms. In this respect internationalisation of the firm will be very closely related to the firm's capability of establishing and sustaining a cross-border network (Christensen, 1991:61; Johanson and Mattson, 1988:309; Welch, 1992).

Since internationalisation is strongly related to the firm's cross border network relations, understanding of the dynamics of industrial networks is important for understanding the internationalisation process. One significant property of network relationships is that they are based on mutual trust. Developing strong relationships will therefore take time and effort. For the same reason it also takes time and effort to replace relationships. Except for

during times of crisis, the dynamics of networks can therefore be characterised as 'stable and changing' (Johanson and Mattson, 1988:306).

The position of the firm in the industrial network is the cumulative result of previous network activities. External stimuli to develop the firm or its position in the network come through the network and are interpreted within the concepts used by the network. As a consequence, the majority of these stimuli will relate to duplications or extrapolations of ongoing activities in the network. Both of these mechanisms support the notion of consistent development.

Strategy in SMEs

The strategy perspective explicitly includes decision and choice as mechanisms and explanatory factors in the long term development of the firm. A development model based on strategy will therefore not be deterministic.

The objective of strategy is to improve the firm's future competitive position through long range adaptation of resources of the firm in conformance with the expected future demands for its products and services. This can be construed as a development process which may, on the one hand, be a premeditated and deliberate planning process. On the other hand, strategy has also been perceived to be the emerging accumulated effect of all activities of the firm[5]. This defines a range of conceptual interpretations of strategy from frameworks for decisions or plans for actions, through the activities for adapting or reorienting resources and to the long range consequences of activities (see e.g. Mintzberg, 1994).

The planning dimension of strategy can only be meaningful when there is a rational decision process (discussed in detail by Moyeen, 1997) which can only be achieved in theory. In the real world the conditions for fully rational decisions can not be met. However, large firms have far better possibilities than SMEs to approximate the requirements for rationality. The difference in available information and capacity for information processing and decision making can possibly explain why small firms tend to be activity oriented in their development process (Gibbs and Scott, 1987), while large firms have the potential to be more planning oriented. Even when there is an absence of strategic planning procedures, the development process of SMEs will often be characterised by a degree of strategic awareness, as pointed out

[5] The strategy can have no effect and has no meaning as an explanatory factor for the management of a firm if it is merely interpreted as the accumulated effect of actions of the firm. Therefore to be a part of the control system of a firm, strategy must as a minimum include a function for long range co-ordinating of the activities.

by Gibb and Scott (op.cit). This awareness may often be sufficient for a small firm to achieve the objectives of strategy.

Unfortunately there is no conclusive evidence on the influence of planning and formulated strategies on performance for SMEs (Moyeen, 1997). Even when positive correlation is reported between planning and performance, the studies are mostly insufficient for identifying the direction of any causality.

The basic features of operationalisation of strategic planning encompass description of current situation or status of the firm, often by pointing out weak and strong points relative to competitors. Furthermore, there is an assessment of future demand for the services or products of the firm and of the required resources or capabilities to meet these demands. In this operationalisation the purpose of the strategy is to outline how to fill the gap between present and future situations, that is desired resources, capabilities and market orientation, and thereby gain sustainable competitive advantage (Porter, 1991).

Without being totally preclusive, the strategy approach tend to counteract one of the acclaimed strong features of SMEs, their flexibility (see e.g. Fiegenbaum and Karnani, 1991:111) and ability to rapidly identify and exploit opportunities (Bhide, 1994:150).

3.2.4 The entrepreneur perspective

There are several important reasons for including the entrepreneur perspective in this discussion. First of all, in small enterprises decisions as well as the implementation of decisions are very often strongly influenced by the decision maker and the decision maker's personal characteristics (Reid, 1981:102; Gibb and Scott, 1986). Secondly, during the internationalisation process there will be events that dramatically change the course of development of the enterprise, very closely related to other change events discussed as part of the entrepreneurial concept. Thirdly, international operation is increasingly being recognised as an option from the starting point of a new enterprise (McDougal, 1989; Christensen and Jacobsen, 1996; Sylvest and Lindholm, 1997). Internationalisation becomes part of the entrepreneurial event of starting up the enterprise.

Internationalisation and entrepreneurship

Internationalisation is rarely addressed in the entrepreneurship. Nevertheless, as discussed in connection with Figure 3.2, certain aspects of internationalisation can be seen as acts of entrepreneurship. In this connection we use the definition by Campbell (1992:22) based on Schumpeter that "...an

entrepreneurial act is the act of carrying out new combinations". In Schumpeter's (1961:66) own conceptualisation, the *new combinations* may be the introduction of a new product, new technology, entering new markets, securing new sources for the supply of raw material, or changing the organisation of industry. According to Schumpeter, entering the international market will therefore represent an entrepreneurial act for the firm. When the firm develops its international activities at later stages, it will alternate between extending present activities on existing foreign markets (managerial activities) and venturing to new markets or new modes of operation (entrepreneurial activities).

One distinction between managerial activities and entrepreneurial activities is that the latter is a discontinuity ranging in size from a quantum jump to a tiny increment (Bygrave 1989b:11). When the increments decrease in size, entrepreneurial activities will gradually go over to managerial activities without any distinct bordering line. Covin and Slevin (1991:7) observe that "...firms with entrepreneurial postures are risk taking, innovative, and proactive", which also can be used as a guide for distinguishing between managerial and entrepreneurial activities.

Initially entrepreneurship was discussed in terms of the personal qualities or activities of the entrepreneur. Covin and Slevin (op. cit.) show that similar concepts may be used to discuss firm behaviour. This focuses on the option of seeing entrepreneurship either as traits of the individual, or as patterns of activity or behaviour. This choice will again decide operationalisation of concepts and basically what is analysed (Sandberg, 1992:79). Irrespective of the focus, manifestations of entrepreneurial activities will tend to appear at unpredictable times and their manifestations will vary.

Due to their different capacities and qualities for securing and processing information, different possibilities for influence by individual entrepreneurs, as well as different capabilities for rapid changes, it is reasonable to expect that entrepreneurial activities will play different roles for the internationalisation of small and large firms (Reid 1981:109). However, both types of development can be expected to be found in all size classes of firms.

The discussion in this section has demonstrated that three different perspectives are required when exploring and analysing the internationalisation processes of SMEs. The market perspective provides the mechanisms for adaptation to competition and exploitation of opportunities; the firm perspective provides the conceptual basis for development of resources, strategy formulation and change mechanisms; and the entrepreneur perspective provides the notion of innovative changes and the vital role of the entrepreneur in any change process.

3.3 Scope of internationalisation

No matter if internationalisation is defined as process or result oriented, as discussed above, internationalisation will always be observed in association with particular fields of activities within the value chain of the enterprise. Occasionally internationalisation is part of the primary activities: logistics, manufacturing, distribution, or service; occasionally part of the support activities: procurement, financing, provision of information, technology development, (cf. Porter, 1985:36). There are close relationships between these functions, with the potentiality for being mutually supportive as well as mutual substitutes: A strong purchasing function may strengthen the competitive position of manufacturing, or alternatively replace manufacturing through outsourcing to foreign suppliers; close relations with foreign customers may be the basis for strengthening the product development and domestic manufacturing, or for establishing foreign manufacturing facilities; and so on.

In internationalisation research, the most important (frequent) scopes of internationalisation are the various conceptualisations of exporting and corresponding organisation of the distribution chain (Welch and Luostarinen, 1984:157; Miesenbock, 1988). Other important scopes of internationalisation are related to manufacturing abroad, procurement of technology, or the establishment of international supply chains, cf. electronics.

Importantly, though, the different scopes require different operational and organisational approaches, capacities, and capabilities from the enterprises. These parameters as well as access to and control of necessary knowledge, information and resources are areas which are closely related to the size of enterprises.

The different scopes of internationalisation also represent different levels of commitment, whether measured as levels of investments, time horizon or as exposure to risk. Within one scope of internationalisation each enterprise may develop from a low to a high level of international involvement and vice versa. Finally, one enterprise may be at different levels of international commitment or involvement for different products. The aggregate sum of commitment, though, represents one dimension of the degree of internationalisation, as expressed by the output-oriented definition, see below.

This approach to conceptualising the dimension of 'scope of internationalisation' very closely resembles the most commonly found categories delimiting the stages of internationalisation, see discussion in Section 3.3.2. These stages are all interpreted as increasing levels of international engagement or commitment, which means that the stages of internationalisation are ordinal

scales for measuring increasing international involvement or commitment, a 'degree of internationalisation'.

Common to most definitions delimiting the categories of the stages models in internationalisation is that they are not based on theoretical deliberations (see also Turnbull, 1983:174; Andersen, 1993:224-5). To illustrate the span of such definitions three examples are presented below, representing a time span of 20 years:

Table 3.1 Three alternative conceptualisations of 'stages of internationalisation'

Stage	*Johanson and Wiedersheim-Paul 1975*[6]	*Czinkota and Johnston 1981*[7]	*Leonidou and Katsikeas 1996*[8] *- Export stages*
1	No regular export activity	The unwilling firm	Pre-engagement
2	Export via independent representatives (agents)	The uninterested firm	Initial
3	Establishment of an overseas sales subsidiary	The interested firm	Advanced
4	Overseas production / manufacturing units	The experimenting firm	
5		The semi-experienced firm	
6		The experienced large exporter	

These definitions represent different approaches to conceptualisation. The table is a good illustration of the incompatibility of the stages proposed by different authors. The definitions can only exceptionally be used to identify equivalent stages, and the numbering of the stages serves only the purpose of internal names within each author's model.

[6] Referenced by Andersen (1993:210)

[7] Referenced by Miesenbock (1988:44)

[8] Leonidou and Katsikeas (1996:532)

3.4 Change models

3.4.1 Classification of change models

Four ideal-type development theories

A theoretical approach to discussing change processes and change models is presented by Van de Ven and Poole (1995). They point to two dimensions of the change process. The first dimension relates to the number of participants in the change process, single or multiple. The other dimension relates to the degree of innovation in the introduced changes, represented by the dichotomy of prescribed (extrapolation) or constructed (quantum leap) change (ibid.:520). The authors distinguish between four ideal-type models, which represent typologies of change patterns. The four types are derived from combination of two dichotomous concepts: the number of participants in the change process - one or several; and the type of programming mechanism - prescribed programme or free, intentional will. However, these concepts are not operationalised nor empirically tested. Further more, they are not contextually developed along the lines of internationalisation.

A one-participant model seeks the mechanisms for change within the enterprise only. The external factors will in these models represent conditions (resources, opportunities, threats, restrictions, etc.) under which the internal process functions. The internal process may be taken as an 'immanent programme', whereby the enterprise follows a prescribed *life cycle*. A large number of the stages models belong to this ideal-type model, namely those models that explain change by intrinsic characteristics of the enterprise, the manager, products, internal resources, etc.

The internal process may also be taken as a 'purposeful enactment' whereby the enterprise implements predefined goals, here denoted *teleological models*. Business strategy models belong to this class of models.

The one-participant change models envisage the environment as passive in relation to the change process. There is no external discriminating action in favour or disfavour of any specific enterprise nor towards individual actions taken by any enterprise.

In multiple-participant models we find two-way relationships and interaction between the enterprise and environment variables. *Evolution models* have multiple participants and prescribed change modes. The changes occur when entities in a designated population compete for scarce resources in a repetitive sequence of variation, selection and retention events. The dynamic development of the demographic properties can be calculated by

probabilistic methods in such models, but not the development of one individual entity. Innovation-adaptation models with stage definitions (Andersen, 1993:223) as well as the Uppsala model (Johanson and Vahlne, 1990) are examples of evolutionary models.

In *dialectic models* the interactions with the environment are pictured as confrontations or conflicts where the enterprises are assumed to have a free choice of actions. These actions by the enterprise provoke reactions from entities in the environment and vice versa. From these competing events the synthesis evolves which prescribes the direction of the change process. (ibid.:520-1). All four ideal-type change models are seen as repeating chains of events, which are fundamentally different for each type. Once the chain of events is completed, the organisation has completed one change cycle and is at the starting point of a new change cycle.

Van de Ven and Poole contend that these four ideal-type change processes are rarely found in a 'pure' form. Usually change processes will be modelled as a combination of elements from two or more of these basic forms. Such combinations are claimed by the authors to potentially describe all types of change processes.

However, there is no mechanism in the original four ideal-type models to explain changes, which are not driven by immanent programmes, nor by competitive confrontations, nor by predefined goals. Such changes are found among enterprises which are *reactive* in the sense that they are responding to actual changes in markets, but *proactive* in the sense that they are constantly alert, actively searching for and exploiting opportunities, and prepared to expose themselves to new situations as well as to adapt to new situations at short notice. Such mechanisms are *opportunistic*[9] since the enterprises constantly search for new opportunities through new combinations of market intelligence and their own capabilities.

The model of Van de Ven and Poole has not been tested empirically. Neither has there been presented any empirical evidence in support of life cycle models, which generally serve the purpose of illustrative metaphors.

The original chart presented by Van de Ven and Poole (1995:520) is represented by the white area of Table 3.2. These change mechanisms focus on environmental constraints and the efforts of the enterprises to overcome

[9] Dwyer (1992:21) referring to the Pappas Report (Australian Manufacturing Council , 1990) uses the term 'opportunistic exporters' to denote enterprises that are primarily oriented towards domestic markets and have small export sales. However, this is a quite different concept from that applied here.

these, often termed 'push mechanisms'. The shaded area, introduced by this author, represents changes driven by opportunistic mechanisms, which are different from programmes, goals or conflicts, e.g. entrepreneurial. The focus here is on mechanisms exploiting opportunities in the environment, often termed 'pull mechanisms'.

Table 3.2 Process models of organisational change[10]

Unit of change	*Mode of change: Prescribed*	*Constructive*	*Opportunistic*
Multiple entities	**Evolution** Population scarcity Environmental selection Competition	**Dialectic** Pluralism Confrontation Conflict	**Network** Co-operation Role models Flexible scope
Single entity	**Life cycle** Immanent programme Regulation Compliant adaptation	**Teleology** Purposeful enactment Social construction Consensus	**Entrepreneur** Innovation Reactive Flexible adaptation

One final observation is that single entity change models are more appealing for their simplicity than for their ability of realistic modelling of the situation of SMEs. No SME can be envisaged as existing in a void without external influence.

Process oriented and output oriented models

Aside from these four ideal-type models, any process can be studied in two alternative perspectives (Havnes, 1994:13): in view of the results or outcomes of the process, or in view of the process mechanisms and relationships themselves. From a researcher's point of view both perspectives are equally interesting. The process itself will be studied to provide understanding of the mechanisms, structures and constraints that control or influence

[10] Adapted from Van de Ven and Poole (1995:520)

the change process. The outcomes of the process will be studied to provide methods for predicting the effects of the process, given a certain condition or set of independent variables. There is, of course, a direct causal relationship between the process and its outcome. But understanding the process does not necessarily provide the tools for predicting outcomes, and adequate tools for predicting outcomes do not necessarily require detailed understanding of the process which produces the outcome.

The important point is, however, that these two perspectives require different types of data. Process oriented models require data which are rich in detail, preferably without predefined structuring and not necessarily representative for other individuals. Such data are associated with case studies. Output oriented models require data which are representative for the total population where detail is traded for general validity. This is generally found in survey type data.

3.4.2 Stages of Internationalisation

The concept ‘stages of internationalisation’ has been mentioned or discussed in several connections. The stages model is appealing by its simplicity and that it intuitively seems reasonable. When interpreted as a change model, as originally intended, the stages models of internationalisation belongs to the life cycle category or evolution category of change models according to the nomenclature of Van de Ven and Poole (1995:520). There is an assumed immanent programme for progression of the enterprise through the various stages, but little acceptance of the ‘regression’ element where enterprises often decline and grow episodically. By describing 'stages of internationalisation' and the factors that contribute to the internationalisation, this approach is, explicitly or implicitly, based on a process model.

The criticism based on insufficient conceptualisation has already been mentioned. Another criticism is the ambiguity caused by a firm possibly being at different stages for different products, different departments or in different markets (Turnbull, 1987: 174). Another aspect that has received criticism (i.a. Watson, 1995:35) is the deterministic interpretation of the development, the idea that the firm must follow a certain sequence of steps (Johanson and Vahlne, 1990:14). If firms jump stages or retract back to earlier stages one of the important manifestations of the model will be missing.

When comparing the various stages models, it is a striking common feature that more emphasis is placed on explaining the process of internationalisation than on the attempts to identify the motives or stimuli for internationalisation. Consequently, any predictive power of a model will most likely be

related to how firms develop, rather than explain which firms internationalise or under which conditions firms will internationalise.

In spite of its central role and more than 20 years of research efforts, a comprehensive review of empirical studies and review articles on internationalisation failed to produce general and conclusive empirical support for the stages model as a general model of dynamic behaviour of enterprises, see 3.5 and Appendix 2.

3.4.3 Incremental and continuous change models

The various theoretical perspectives have implications for the dynamic properties of associated change models. These implications stem from intrinsic properties related to conceptualisation, mechanisms and assumed relationships of the models. Some examples will clarify this.

Network models assume that there is a communication network between individual enterprises. Relationships within the network extend beyond contractually regulated business arrangements, providing a considerable influence through relationships built on trust. An existing network therefore represents an 'investment' and a starting point for developing new branches and nodes. However, this development depends on building trust between new partners, which takes time. Any change in the network will therefore appear, to the outside observer, as happening slowly and in small steps from a starting point of an existing network.

The four ideal-type change models of Van de Ven and Poole, discussed above, all envisage stepwise small changes in continuous cycles.

The accumulation of market knowledge and increased commitments of the Uppsala model is explicitly assumed to be in small steps.

It is equally important that the steps of these change processes are all assumed to involve more knowledge, more resources, more network relationship, more exporting, etc. As discussed in Chapter 2, this describes change models which are all basically incremental and uni-directional. No alternative development mode is envisaged for the enterprises.

In this respect these models are normative. When continuous and incremental growth is assumed to be the norm; decreasing number of employees, decreasing sales or decreasing exports are regarded as not normal and are interpreted as indicators of malfunctioning or failure (Turnbull, 1987:172; Havnes, 1996d:2).

3.4.4 Previous empirical research

3.4.5 Review contributions

There have been a number of review articles on internationalisation and exporting, see Appendix 2 Table A2.1. There are a few points where these authors are in complete concord over a period ranging from 1978 to 1996. First of all, longitudinal data and longitudinal analyses are required to study the internationalisation process, but hardly ever can examples be found of longitudinal testing of the hypothesised processes. Secondly, the internationalisation process itself is complex and the variables as well as relationships are multi-dimensional. Many diverging and contradicting results are reported in empirical studies which have been attributed to one or several of the elements:

- differences in populations which are not accounted for,
- insufficient definitions of concepts,
- using one dimensional variables,
- too simplistic relationship models.

There are diverging opinions as to the support for the stages model. Criticism has been directed towards conceptualisation of stages as well as design of test procedures, and the deterministic approach to the development process (Turnbull, 1987; Andersen, 1993; Leonidou, 1995b; Leonidou and Katsikeas, 1996). Even though this author does not share their opinion, see discussion in Section 3.5.2, it should also be mentioned that several of the reviewing authors are satisfied that a version of the stages model has been supported (Reid, 1981; Thomas and Araujo, 1986; Miesenbock, 1988). One reason for this discrepancy could be failure by these authors to distinguish between 'stages' as a process concept and 'stages' as a measuring scale concept, cf. the introduction to this chapter.

3.4.6 Research strategies

A review of reports on 39 empirical studies related to exporting and internationalisation, see Appendix 2 Table A2.2, reveals some interesting points about the present status of this research. These reports cover publications made over 15 years, 1981 to 1996. Some of the early, and frequently cited, publications are not included since they are covered by the majority of the review articles summarised in Table A2.1. This is by no means a complete listing of research publications within this field, but the selection is suffi-

ciently wide and comprehensive to give a very good representation of the state of the art for this field of research.

Research design

The vast majority, 33 studies, used only data collected at one point of time. Only three studies used observations from more than three points in time. The first 33 studies used some type of cross-sectional analyses, while the two of the studies with access to longitudinal data used repeated cross-sectional analyses. In other words, only one of these 39 analyses used a combination of data collection and statistical analyses that would enable tracing development of individual enterprises.

Of the 39 studies, as many as 32 used data from only one country or even from a part of one country. Three studies made comparisons based on data from two countries; and three compared enterprises from more than three countries. There is therefore hardly any control for cultural effects, nor for the effects of market size and market vicinity.

A majority of 28 the studies do specify the industry sectors of their population, which almost invariably are manufacturing industries. However, none of the studies explicitly analyse for the effects of industry sector specific influence on export performance measures.

The selection procedures for the included enterprises are generally not very clearly stated. When it is described, it is mostly some variation of a random selection procedure. However, many countries lack complete central census data on enterprises, leaving telephone directories, 'membership rosters', etc. as the only sources for identifying the total population of enterprises. Selection procedures and composition of samples are both very critical for external validity, and hence for the possibility of comparing as well as generalising results from empirical studies.

Size has been defined as a relevant and tested or discussed parameter in 23 of the studies. In total, 29 of the publications made size-related definitions of their population of enterprises which clearly relate the study to small and medium-sized enterprises. However, the definition of size varies both in relation to measure (employees, turn-over, ownership, affiliations) and in relation to limiting values of the size measures.

Research model

The research ambitions revealed by the choice of research designs seem to be quite modest. As expressed by Leonidou (1995a:150) "Despite a substantial body of contributions on the subject, the conceptual, methodological

and empirical analyses revealed that the bulk of current research is still at the identification and conceptualisation stages,... ". The majority of the efforts are concentrated on identifying a correlation between a set of independent variables and the chosen measure of export performance[11]. «....the dominant approach has been to classify the firms into stages and then examine firm characteristics associated with each stage using correlation type analysis.» (Calof and Beamish, 1995:118). Another frequent approach is to establish profiles of exporters as opposed to non-exporters, i.e. a typology approach. Only six of the 39 studies attempted to analyse dynamic properties of the internationalisation process, invariably 'testing' a version of the stages model. One common trait of these tests is that they demonstrate that enterprises may be classified according to the criteria used to define the categories. Some authors also establish a relationship between stage categories and other variables. But generally the progress of the enterprise through the stages is not established. This focus on the stages model as categories of increasing internationalisation is synonymous to establishing an ordinal scale for measuring internationalisation (Hair *et al.* 1992:6), and far from establishing a dynamic model of the internationalisation process.

The studies, which claim to test causality almost invariably, refrained from validating conclusions based on relationships with observations of time sequence. Only one study used genuine longitudinal data in combination with time-series analytical techniques (Christensen and Jacobsen, 1996). In addition one study used retrospective data to validate time relationships between cause and effect (Calof and Beamish, 1995).

3.5 Summary

Some of the ambiguity of the discussion around internationalisation of SMEs can be attributed to the lack of conceptualisation. First of all the categories or scale of the variables delimiting the enterprises of the samples are either not consistent or ambiguous. Secondly the internationalisation concept, when used, is often only implicitly defined, and very seldom discussed. And finally, analyses are often based on stages models with arbitrary definition of the number and delimitation of the stages.

However, the most important criticism must be that although theory development for a long time has focused on the *internationalisation process*, virtually none of the empirical studies could possibly test a hypothesis on the

[11] In this connection initiation of exporting is considered to be one measure of export performance.

dynamic properties of the process due to deficiencies in their research design. By using only one point of observation earlier research has been able to prove a correlation between a number of factors and various measures of increasing degree of internationalisation. It has also provided a number of criteria for establishing alternative ordinal scales - stages - for measuring the degree of internationalisation. But virtually no empirical evidence has been presented which may link or describe the dynamic progression of the enterprise in the internationalisation process.

A thorough survey of review articles as well as recent publications on empirical research, see Appendix 2, shows that with only three exceptions (Gankema *et al.*, 1996; Christensen and Jacobsen, 1996; Rao and Naidu, 1992), empirical support is found only for non-dynamic relationships between the independent variables and the various operationalisations of internationalisation.

Alternative theory perspectives to the stages model have only to a very limited extent been the basis for empirical research on SMEs and the internationalisation process. One important common feature of most of the applied theoretical perspectives is their implicitly assumed pattern of incremental and continuous change. Any model based upon this assumption will fail to recognise other patterns of temporal change, and may therefore lose sight of information pertaining to other change patterns.

4 OPERATIONAL FRAMEWORK

4.1 Research model

The description of the research model utilised in this thesis consists of two main parts. The first part is the conceptual model describing the concepts and the hypothesised relationships between these. The second part develops the conceptual model into an analytical model using the same concepts and relationships but also taking into account the time sequence of the observations. Building on the conceptual model, the analytic model describes how the time element is included in the computation.

4.1.1 Scope of internationalisation

As developed in the previous chapters, internationalisation is viewed as one specific change process within the enterprise; and exporting is being used as the proxy for internationalisation (cf. Welch and Luostarinen, 1988:157). In this respect the scope of internationalisation is the exporting activity; including starting up, developing, and ending export sales. To improve conceptual clarity, the object of sale is further restricted to physical products.

It must be clearly recognised that when exporting is chosen as a proxy for internationalisation, the number of dimensions of this concept is drastically reduced, improving clarity but sacrificing validity. To a certain degree the effect of this sacrifice is reduced by including some of the dimensions of internationalisation, such as information channels, co-operation and distribution channels, in the model as independent variables.

Two alternative measures are available for exporting, the absolute value of export sales and the value of export sales relative to total sales, by other authors also denoted as 'export intensity', 'export rate' or 'export quota'. The last term is used in this study.

It is reasonable to assume that there is a close relationship between the cross-border commitment[12] associated with a high export quota and the cross-border commitment associated with a 'high degree' of internationalisation when more dimensions are included in the latter concept. The reason is that high export quota will also necessarily be associated with extensive informa-

[12] Cross-border commitment is understood as irreversible investments in time or money to facilitate activities that transcend the borders of the home country of the enterprise.

tion flow, cross-border capital flow, and cross-border organisational aspects. These are all important dimensions of an extensive internationalisation concept.

One further advantage in limiting the scope of internationalisation to exporting is that by doing so, results will be comparable with a large section of earlier research on internationalisation and the internationalisation process.

4.1.2 Theory perspective

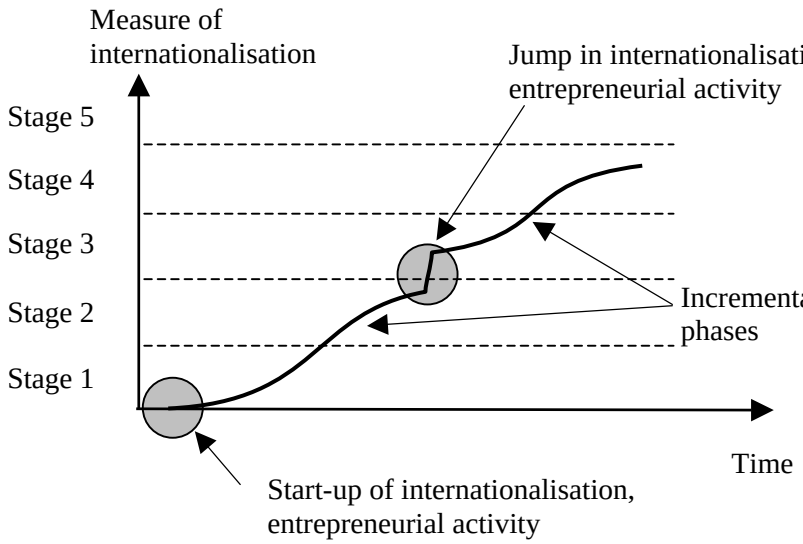
There is no clear guide as to a 'proper' or 'correct' choice of theory perspective. Previous research has been characterised as lacking theoretical foundation, see 3.6, and offers little guidance in this respect. As discussed in Chapter 3, there is a clear disadvantage in choosing a narrow theoretical platform. This study of the internationalisation process will therefore include contributions from different perspectives.

The basis for the research model, which will be presented here, is the firm perspective with a strong influx of ideas from network theory and learning models. The roles of markets as venues of competition as well as meeting places with customers and sources of information are observed by including concepts and mechanisms from the market perspective. Finally, the innovative aspects and creative search for new opportunities, as well as discarding of inferior practices, can be depicted by central elements of the entrepreneurial theory.

Returning once again to Chapter 3 and the review of previous research contributions, two major criticisms were put forward regarding a large part of the empirical research on internationalisation: first of all on the very narrow approach to conceptualisation and the use of simple models, and secondly on a very low degree of precision as to definition of the theoretical basis. Both of these criticisms will be considered in developing the research model.

Once again it must be emphasised that the chosen approach gives advantages as well as disadvantages. The most important disadvantage is that the coherence of the theoretical model may be eroded by incompatibilities when concepts and relationships are derived from different theoretical perspectives. To avoid this requires a high degree of specificity when defining concepts, relationships and corresponding areas of applicability. The most important advantage is that the model will be more comprehensive and take into account more dimensions than if it had been based on one theoretical perspective alone.

Figure 4.1 Generalised change pattern. Uni-directional and stepwise change of internationalisation



4.1.3 Change model

Incremental change pattern

The dominating concept of change models encountered in research on internationalisation has been some version of a gradual incremental model. The general dynamic property of this change model can be expressed as depicted in Figure 4.1 (Havnes, 1994:3), which was the theoretical starting point of the present study. There are three types of changes included in this manifestation of the development process.

The start-up phase may represent barely measurable changes in any continuous and absolute measure of internationalisation, such as the difference in export sales in two consecutive intervals. Nevertheless, such changes represent the dichotomy of *not being* and *being* internationally active.

A jump phase will be observed when major increases in international activity take place over a short interval of time. An example of this type of change would be entry into a large number of new foreign markets, e.g. increasing the geographic scope, in a short and intensive campaign. Changes

of this type would be observable as jumps on a continuous measuring scale of internationalisation.

Common to both of these types of changes is that they represent reorientation of the activities of the enterprise, requiring innovation. The activities required to accomplish such changes are frequently denoted 'entrepreneurial activities'. If continuous measures of internationalisation exist, and the relationship between time and the measure of internationalisation can be described by a mathematical function, the entrepreneurial phases of the function in Figure 4.1 would be recognised by having first derivatives with very high or infinite positive values.

Incremental phases dominate Figure 4.1. These are intervals where changes over time are so small that they can be assimilated by the organisation through extrapolation from previous activities. The procedures for handling such changes are embedded in the managerial system of the enterprise. The organisation will experience this type of development more as adjustments rather than change. The uni-directional element is caused by the implicit assumption that all increments are positive, that is: 'more', 'better' , 'larger', etc. These phases will be recognised by having finite and positive first derivatives if mathematical definitions of the growth functions exist.

The measuring scale for internationalisation may conceivably be continuous, such as a computed index of internationalisation or export sales as percentage of total sales. However, the scale may also be ordinal, a pre-defined number of categories with a successively higher degree of internationalisation. This ordinal scale may be derived from qualitative decision rules, by segmenting a continuous scale, or as a combination of these two. All of these three methods have been applied to establish the various scales known as 'stages of internationalisation'.

Irregular change patterns

As pointed out in Chapter 3, it is not empirically verified whether or to what extent enterprises conform with a model of uni-linear, incremental growth. On the contrary, it is quite conceivable that some enterprises, at intervals, will go through periods of decline or periods of fluctuation, no matter which performance measure is used. By establishing mutually exclusive categories of change patterns, it is possible to analyse how common the various change patterns are; what factors influence those change patterns which are established; and what the effect is on output of various change patterns.

A minimum of two observations is required to identify changes. With observations at two points in time and no other information available, the representation of changes must be linear, since, under these conditions, linearity

is the only possible interpolation between two points of observation. The interpolation of changes over one interval is the building block of any temporal description of a change process. By joining successive building blocks the temporal representation of development evolves. Firstly, the depiction will be a broken curve. When more observations are added, the appearance of the curve will (most often) be smoothed, and information on progression over several intervals may be used to further smooth the curvilinear representation of the change process. In order to differentiate changes based on the minimum number of points of observations and on multiple points of information, the following terms will be used:

First order models of change are descriptions of changes that are based on observations at two points in time, that is, changes occurring over one interval of observation.

Second order models of change are descriptions of changes that are based on observations at more than two points in time, that is, change patterns which become visible only when analysing the temporal development over several intervals of observation.

Provided that a mathematical description of the relationship between time and the changes exists, the first order change model will be recognised by having a constant as first derivative and consequently the second derivative will be zero. A second order change model will be recognised by having a linear, time dependent first order derivative, and second derivative different from zero. The minimum requirement for establishing a first order change model is observations at two points of time. The minimum requirement for a second order description is observations at three points in time.

The first order model can identify that performance changes over time and represent the changes by linear approximation. The second order model can identify that the rate of change varies over time. Higher order models are also feasible, and would identify how temporal relationships change over time, e.g. characterise changes in the rate of change.

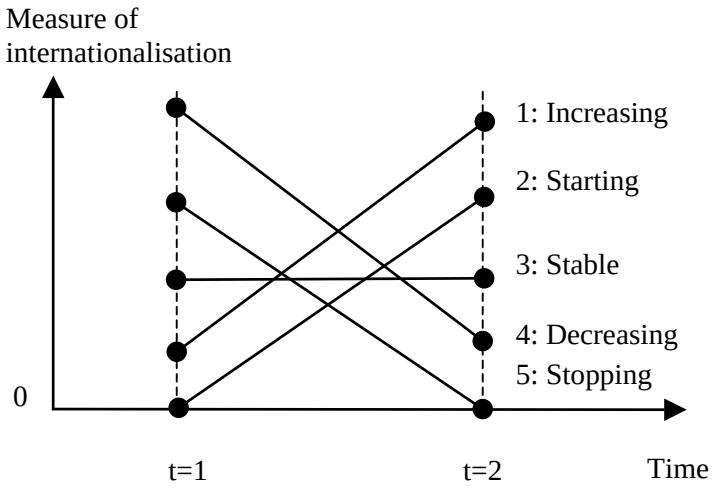
A useful metaphor for the first order description of change patterns could be a photograph, a still picture. Similarly, the metaphor for the second order description of change patterns could be a series of pictures converging into a motion picture when the intervals between exposures (observations) are reduced.

In first order change patterns all development is pictured as linear. Based on two observations three principally different categories with two subcategories are possible:

- Increasing, line (1); the measure of the second observation is significantly higher than for the first observation; with sub-category,
- Starting, line (2); where the measure for the first observation is zero and the second observation different from zero,
- Stable, line (3); there are negligible changes between the two observations,
- Decreasing, line (4); the measure of the second observation is significantly lower than the first observation; with sub-category,
- Stopping, line (5); where the measure for the first observation is different from zero and the second observation equals zero.

The resulting five categories are depicted in Figure 4.2.

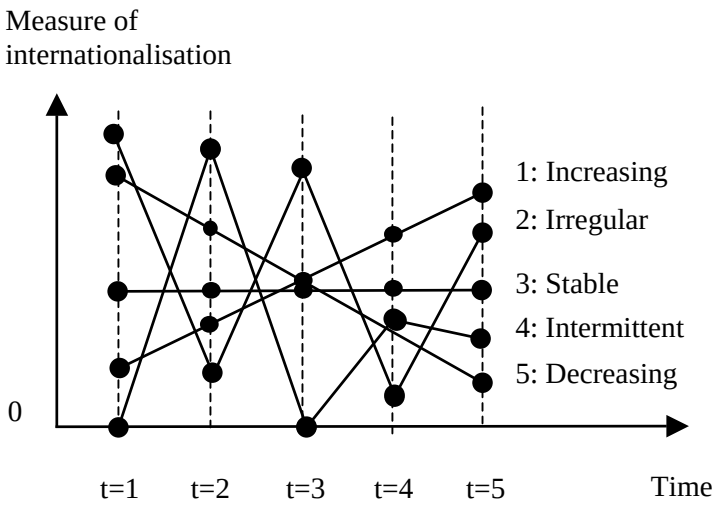
Figure 4.2 First order change patterns



Second order change patterns are recognised by observation over several points in time. Changes over time may be categorised by five distinctively different dynamic change patterns as depicted in Figure 4.3. These patterns are generated by selective combinations of the first order change patterns in Figure 4.2.

The incremental growth pattern, curve (1), will be recognised by an increased value for the observed variables over the observations, which is a simplified and idealised version of the pattern depicted in Figure 4.1. The inverse change pattern will be the incremental decline pattern, curve (5). For some enterprises the pattern will depict a stable situation, curve (3), with no or only minor change from one observation to the next. There will, conceivably, also be enterprises with irregular change patterns, curve (2). These

Figure 4.3 Second order change patterns



enterprises are fluctuating between intervals of growth and intervals of decline. Other enterprises may exhibit even more extreme changes. They have an intermittent change pattern, curve (4) recognised by the dichotomy of being active and not being active exporters in several of the observations. These five categories of change patterns are mutually exclusive.

It is not likely that any enterprise will fully comply with these idealised change patterns. In addition to the general patterns, there will also always be small temporal fluctuations, which can be seen as variations over the basic trend or pattern. Consequently, a definition of stability must allow for differentials between two observations which are so small that they are most likely caused by random variations, not by an underlying change process.

In this presentation the term *period* is used to define the time span between the first and final observation of the series of observations. This is subdivided into *intervals*, being the time span between two consecutive observations. The intervals define the building blocks of the temporal description.

Second order change patterns require a minimum of three observations to be distinguished from first order change patterns. However, additional observations will improve the reliability of the categorisation, see Appendix 4.

The length of observation intervals as well as the number of intervals in the observation period (the total length of period of analysis) will strongly influence the fluctuation that may be expected in the observed patterns. When observed over a long period of time, most enterprises can be expected to display large variations in one or more performance parameters; and *vice versa* for short observation periods. For some performance measures expected fluctuations will also be larger than for others. The length and number of intervals as well as the actual performance measure must therefore be assessed to establish what changes from one observation to the next can be tolerated for the change pattern to be classified as 'stable'.

4.1.4 Change modes

The details of the change mechanisms are not the topic of the present study. However, understanding the mechanisms will facilitate interpretation of the results of the statistical analyses. A brief outline of the change mechanisms is therefore warranted.

Following the reasoning behind *prescribed change modes*, see Table 3.2, programmes for development of the enterprise are embedded in the enterprise structure. The factors influencing changes will be found in enterprise structural factors combined with environmental elements defining conditions for change, which together initiate the phases of a programmed sequence. The Uppsala model proposed by Johanson and Vahlne (1977, 1990) describes this type of mechanism. Changes following the mechanisms of *constructive change modes* include the option of managerial planning and choice in the change model. The direction of development is not programmed but selected at two stages; firstly when defining and redefining the strategy to follow, secondly when making corrections for divergence from the strategic plan or as response to actions of competitors. In the context of export orientation Christensen and Jacobsen (1996:4) describe enterprises where an export strategy was evident when the enterprise was started. Enterprises that follow the mechanisms of *opportunistic change modes* do not pursue preconceived strategies. Changes are perceived as being caused by managerial choice, not intrinsic programmes; but the choices are made dis-

criminatory for each activity in pursuit of opportunities not in accordance with strategic plans and not in response to competitive actions. Changes in external relationships will be a result of changes in export orientation. Miesenbock (1988:45) mentions that 'unsolicited orders' were among the most commonly found external factors stimulating start up of exporting in the studies reviewed by him. An opportunity arises, seemingly fortuitous, is taken advantage of and will thus form the basis for new activities. However, it is also conceivable that later unsolicited orders may come from domestic markets and (temporarily) impede further development of export sales by filling the total capacity during one time interval.

As underlined by Van de Ven and Poole (1995:524) neither the change modes, nor their further detailing in change motors, are often found in pure forms. In stead one should expect to find combinations of change motors used in practical cases. Consequently, different types of change patterns should be expected for different types of enterprises and for enterprises in different situations.

4.1.5 Output oriented model

The focus of the present analysis will be on the factors influencing export orientation and the effects of export orientation on the total performance of the enterprise. The focus of interest is the *export orientation process* viewed as one example of a change process in the enterprise. What are the dynamic properties of this process? What are the factors influencing the dynamic properties of the export orientation process? And: what are the influences of the export orientation process on the total results of the enterprise? By choosing this approach we sacrifice the opportunity to study the mechanisms of the process, but gain the opportunity to assess relationships on a statistical basis and to assess the validity in the sense that results can be identified as being applicable to categories of enterprises.

4.2 Conceptual model

The rationale for studying the *export orientation process* has been presented above. The conceptual model delineates this process by defining the entities of the process and the relationships between them. The main elements of the conceptual model, set out in Figure 4.4, are as follows:

The export orientation process encompasses the mechanisms and activities that decide how and to what extent the enterprise:

- enters foreign markets,

- adapts to selling its products in foreign markets,
- adapts to selling in one or several foreign markets,
- builds procedures to adapt products to foreign customers,
- extends and improves market intelligence networks in foreign markets, and
- builds distribution systems for products in foreign markets.

The export orientation process includes resource allocation, strategic decision making, developing administrative procedures, developing co-operation, building competence, extending information gathering and information interpretation, etc. This illustrates clearly why export orientation (and internationalisation) is considered to be a multi-dimensional concept.

The direction of change induced by the export orientation process is not predefined. An enterprise may increase its export involvement as well as decrease it.

The export stimuli are catalysts for initiation or change in the direction of the export orientation process. The export stimuli are factors which do not directly intervene with the mechanisms of the export orientation process. They may be regarded as triggers or signals to initiate or change export involvement, and will be found internally or externally.

External factors may be positive with respect to exporting, such as increasing demand in foreign markets, direct and unsolicited inquiries, increased domestic competition; or negative, such as cumbersome border formalities, culture and language differences, etc. Likewise the internal stimuli may be positive or negative. Excess capacity, good products or personal contacts abroad may stimulate starting or expanding the export process. Lack of resources, lack of competence or strong risk aversion may all function as internal negative stimuli in relation to the export orientation process.

The properties of the enterprise and the entrepreneur define the internal conditions for the export orientation process. A number of these are largely descriptive parameters, such as nationality, industry sectors, and ownership, which for all practical purposes are independent of the outcome of, but may influence or restrict, the internationalisation process. Over short periods these can be regarded as constant parameters defining the current operational conditions of the process. There are also a number of internal factors which interact with the export orientation process. These variables influence the outcome of the process, as well as being influenced by the outcome of the process. In this respect the enterprise with its personnel, resources, capacities, competence, experience, and procedures is part of the functional feed

back mechanism in the export orientation process, first described in the Uppsala model by Johanson and Vahlne (1977: 26), see Figure 3.3.

A large number of the variables defining the enterprise are closely linked with the person and personal traits of the entrepreneur. For some purposes it is difficult to distinguish between the entrepreneur and the enterprise, for other purposes it not important to make such distinction. For these reasons measures related to the enterprise and to the entrepreneur are analysed concurrently to allow for the possibility of converging these two concepts into one combined concept in the model.

External interaction encompasses all interchanges between the enterprise and its environment. There are three main interrelated categories of such interchange. First of all there is the materials flow in the distribution chain. Secondly, there is the co-operation with other enterprises in contractual on non-contractual forms, and thirdly there is the information flow. The external interaction encompasses many of the instruments for execution of the export orientation process as well as much of the information required for the decision process. The external interaction is also influenced by the outcome of the export orientation process. As an example, information on foreign markets can be obtained directly or as a result of communication with customers as part of the distribution process. There is therefore a process feed-back loop also via external interaction.

The export orientation of an enterprise is a multi-dimensional measure of the results from the export orientation process. As discussed above, we will here use export orientation as a proxy for internationalisation. The basic measure of export orientation is the dichotomous variable with the possible values: exporter and non-exporter. Other important dimensions of the export orientation concept are the relative volume of export sales, the number of export markets, and the geographical concentration or divergence of the export markets.

Total performance is here captured in two dimensions. The first is the total sales of the enterprise. This is an indicator of the market adaptation, but also of the efficiency of the total value added chain of the enterprise[13], and as such has significant practical implications for the enterprises.[14]

[13] In a recent study, Wicklund (1998:214-15) concludes that growth in total sales is a good indicator for the total performance of SMEs.

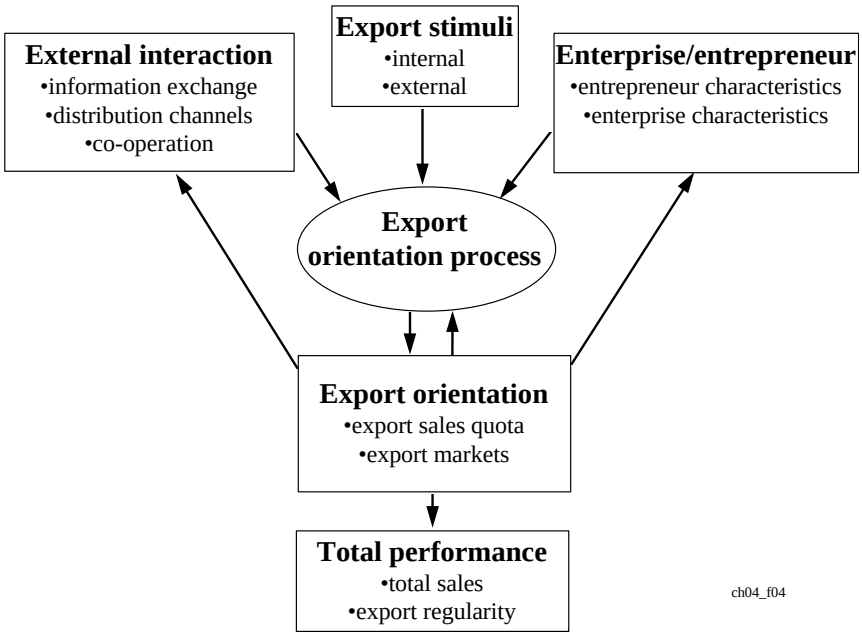
[14] Alternatively employment could have been selected as measure of total performance, but for two important reasons: Employment is strictly not an output variable, not a measure of performance from the enterprise point of view. Employment is an input variable, representing

The second dimension is the change pattern of export orientation over time, the export regularity. This aggregate measure is based on the analysis of the temporal variation of export orientation. The objective is first of all to establish to what extent there are distinct and different change patterns. Secondly, this will be the basis for analysing which factors influence the development of change patterns. It is also important to assess the inter-relationship between these two measures of total performance.

The complete conceptual model is depicted in Figure 4.4. This describes the process flow and consequently hypothesised relationships between the concepts. Since this is a dynamic process, however, the analytic model will be more complex.

a resource or a production capability. Other factors being constant, employment as a performance measure is closely related to total sales (Storey, 1994:113).

Figure 4.4 Conceptual model of export orientation



4.3 Dynamic analytic model

In addition to the concepts and relationships between these, the analytical model must also define how the dynamic element will be included in the analyses.

The first observation defines the starting point of the enterprises, including an initial state of export orientation. Except for newly started enterprises, any change process will proceed from this starting point, which may be at zero level (no involvement in export activity). All changes occur as a consequence of activities within the enterprise, which take place during the time interval between two observations. Changes caused by these activities cannot be observed before the end of the time interval.

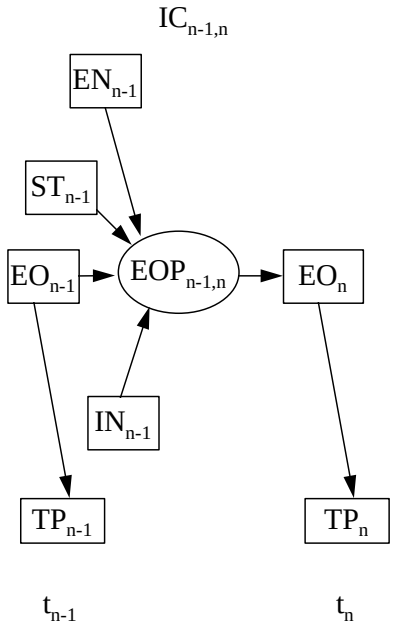
Using the same concepts as in the conceptual model, Figure 4.4, the following abbreviations are applied in the dynamic model:

Table 4.1 Legend of abbreviations used in Figures 4.5 and 4.6

Export stimuli:	ST_x	$x = 1 \rightarrow n$
Entrepreneur/enterprise properties:	EN_x	$x = 1 \rightarrow n$
External interaction:	IN_x	$x = 1 \rightarrow n$
Export orientation:	EO_x	$x = 1 \rightarrow n$
Export orientation process:	$EOP_{x-1,x}$	$x = 2 \rightarrow n$
Total performance:	TP_x	$x = 1 \rightarrow n$
Time of observation :	t_x	$x = 1 \rightarrow n$
Interval of change:	$IC_{x-1,x}$	$x = 2 \rightarrow n$
Number of observations:	n	

The analytic model of these concepts, corresponding to a first order change model, see Figure 4.2, is described in Figure 4.5. This model covers the time

Figure 4.5 Analytical model of change in export orientation - first order change patterns

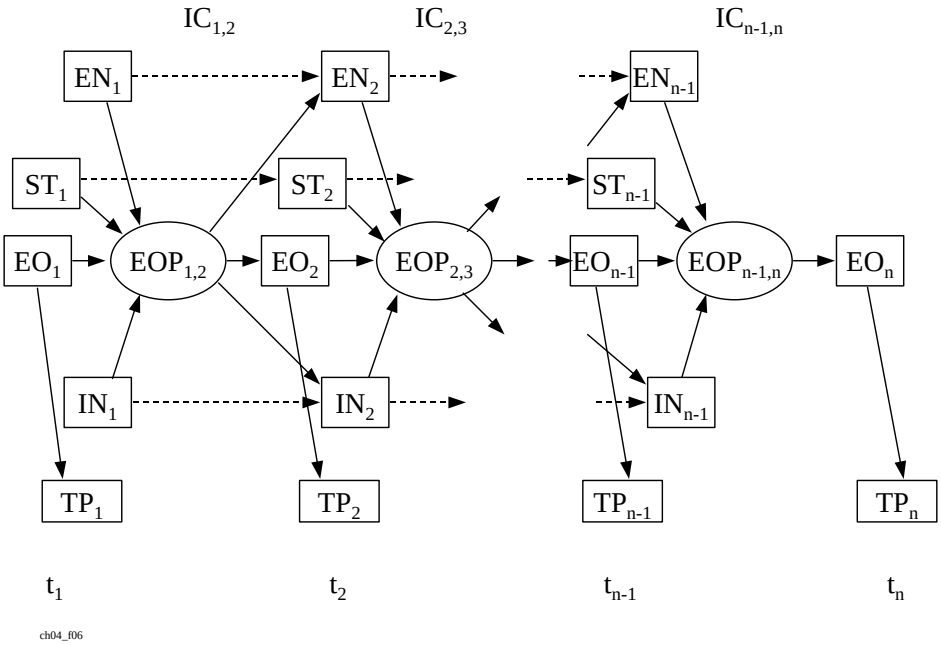


interval from t_{n-1} to t_n and can be used to plot changes as linear developments, but not to analyse development patterns over several intervals.

The important difference between the first order change model of Figure 4.5 and the majority of research models used in previous empirical studies of export development is that Figure 4.5 includes two points of observation, which enable distinguishing the initial and final status of the variables respectively. Commonly studies of the export orientation process have only one observation, the initial (t_{n-1}), neglecting the fact that changes cannot be identified without also including the final (t_n) observation of output variables.

By linking successive observation intervals, the total dynamic model will be aggregated from the first order model, as demonstrated by Figures 4.2 and 4.3. The aggregated dynamic model, suitable for analysing second order change patterns, is depicted in Figure 4.6.

Figure 4.6 Analytic model of change in export orientation - second order change patterns



The purpose of this total model over all observation intervals is to reflect the cumulative nature of the change processes. The cumulative nature pertains to external factors as well as to internal factors. Therefore the model includes relationship links between all 'external interaction' factors, all 'entrepreneur/enterprise property' factors, etc. However, the existence, direction or strength of this cumulative effect are not part of the theoretical models to be tested. These relationships are indicated for illustrative purposes in Figure 4.6 as broken arrows, and will only be analysed very briefly.

The important issues for the dynamic model are firstly to ascertain which relationships display changes that are functions of time; secondly, to establish the nature of these functions of time. Examples of such time dependent relationships could be that relationships between variables have similar or equal strength (constant) in all observations; growth rates of different variables are strongly correlated; or variables with significant loading in factor analyses remain stable over all observations.

4.4 Hypotheses

As documented in Chapter 3, previous research contributions on internationalisation of SMEs are characterised by lack of temporal data (Calof and Beamish, 1995; Leonidou, 1995a), see also Appendix 2, and lack of other than incremental and continuous change models (Turnbull, 1987; Andersen, 1993; Leonidou and Katsikeas, 1996). The two concepts 'change patterns' and 'export regularity' or any similar concept are therefore not found in previous empirical research. The practical consequence is that the hypotheses presented here to a large extent will extend beyond the theory foundations provided by previous research. For this reason, it is also important to explore the possibility that the data may reflect other relationships than those expressed by existing theories. The challenge is therefore on the one hand not to be excessively restricted by the shortcomings of previous research, and on the other hand to avoid a purely numerical search by statistical analysis.

Some of the hypotheses will therefore be anchored in previous research, while others are guided by previous research but are mainly the result of the deliberations of this researcher.

4.4.1 Existence of distinct change patterns

The first step in the analysis is to establish whether or not there are different dynamic change patterns in export orientation. The stages models prescribe continuous and uni-directional development and have received contradicting

support in previous studies (Reid, 1981; Thomas and Araujo, 1986; Turnbull, 1987; Miesenbock, 1988; Andersen, 193; Leonidou, 1995b; Leonidou and Katsikeas, 1996). Porter (1991:97) points to the task of strategy to "... maintain a dynamic, not a static balance [with the environment of the firm]". However, his focus is on the requirements of large firms to ensure consistency throughout functional departments (ibid. :96), suggesting rational and long term objectives. Bhide (1994:150), on the other hand emphasises the ability of successful entrepreneurs to make quick analyses and decisions in *lieu* of careful planning which will enable them to identify and seize opportunities. No previous example of empirical testing of the existence of multiple change patterns has been found. The objective at this point will therefore be to ascertain to what extent different change patterns are found among different categories of the enterprises in the sample.

Consequently the first hypothesis to be tested relates to the premise that the incremental growth model represents the sole change pattern:

H_1 *There exist other change patterns for development of export quota than the incremental growth pattern.*

4.4.2 Factors influencing type of change pattern

Assuming that different change patterns will be found, it is of interest to establish the factors that may cause enterprises to pursue different development paths. Recognising the exploratory nature of this investigation, attention will initially be given to the factors that are often considered to be the generic properties of the firm: industry sector, size, and nationality.

Managerial and administrative capacity have been linked to the size of the enterprise (i.a. Dwyer, 1992; Nooteboom, 1993:288), enhancing the capability of information handling, planning and controlling the development process. This would be more compatible with stable and incremental change patterns than with irregular and intermittent patterns. However, a varying degree of association has been found between size and export performance in previous empirical studies, see Appendix 2, Table A2.2. It is also often assumed that flexibility and adaptability decrease with increasing size of the enterprise (Walters and Samiee, 1990:45; Nooteboom, 1993 :287). Both of these mechanisms would lead to different change patterns for small and large enterprises, with increasing propensity for deliberate and stable development patterns for increasing size of enterprises. The hypothesis to be tested will therefore be:

$H_{2,1}$ *Small and large enterprises will exhibit different change patterns in their export quotas.*

Different products meet different market conditions with regard to fluctuation in demand and relationship to customers (Culpan, 1989). Some products are typically oriented towards the home market, where proximity to customers and their needs is a central factor; other products require an export market because home markets are too small for efficient manufacturing. At an over-all level this leads to the hypothesis that different products have different markets (Craig, 1993), and thus a different propensity for export orientation. In practical terms it is impossible to tests a hypothesis at product level. To a certain extent, however, the market differentiation of products is aggregated at industry sector level. Consequently industry sectors will have different propensity for export orientation. Previous research on export orientation has mostly neglected this factor, see Appendix 2. From a strategy perspective Hitt and Tyler (1991:341) found supporting evidence that the industry sector has an effect on strategic decisions.

The hypothesis to be tested is therefore:

$H_{2,2}$ *Enterprises from different industry sectors will exhibit different change patterns in their export quotas.*

Cultural differences (Schneider and Meyer, 1991), psychic market distance (Johanson and Vahlne, 1977; Johanson, 1990; Holzmüller and Kasper, 1990), and domestic market characteristics (Schlegelmilch, 1986a; Porter, 1990; Westhead, 1995) are all factors which have been studied as potential causes of export development with a varying degree of empirical support. One common feature of these factors is that they are all uniquely related to the home country of the enterprises. In relation to export regularity, differences in distribution costs will produce national specific vulnerability to fluctuation in prices. Each country will have a unique combination of the factors:

- language and cultural difference or similarity with major markets,
- relative size of domestic markets to major foreign markets,
- distances and costs to reach major foreign markets,
- similarity of domestic and foreign legal structures.

If such factors dominate the patterns of the export development process, export development pattern will be different in different countries. Hence the hypothesis to be tested will be:

$H_{2,3}$ *Enterprises from different countries will exhibit different change patterns in their export quotas.*

The strategic approach to exporting will be closely related to the ability to accumulate and interpret export market intelligence and the ability to control sufficient resources (Cavusgil and Naor, 1987; Ahokangas, 1998). Generally, volatility in resource allocation in the production systems will be associated with frequent and costly changes. Most enterprises will therefore attempt to avoid volatility if possible. Given the ability to foresee changes and to control resources through planning, such ability will also be directed towards stabilising export sales through planned efforts (Dwyer, 1992; Bhide, 1994).

$H_{2,4}$ *Enterprises with entrepreneurs who put little emphasis on planning will have a propensity for intermittent or irregular change patterns of export quotas.*

The central role of the entrepreneur on the development of the export orientation has been examined in numerous studies and over a very long time period (i.a. Reid, 1981; Johnston and Czinkota, 1986; Schlegelmilch, 1986b; Gomez-Mejia, 1988; Holzmüller and Kasper, 1991; Manchini and Prince, 1993; Calof and Beamish, 1995; Westhead, 1995). Competence, including experience, as well as attitudes and motivation have been examined by these researchers, and found to be positively related with export performance. As mentioned above, these studies are all cross-sectional. It is therefore impossible to make any inference of causality or the direction of causality. The cited analyses also tend to analyse a selected few items related to either competence, attitudes or motivations. It is therefore impossible to assess which attribute or which combination of personal attributes of the entrepreneur influences export orientation. Further insight and guidance for theory development must therefore be provided by examining the empirical data in a dynamic model. Hence the hypothesis to be tested will be:

$H_{2,5}$ *The personal attributes of the manager will interact with development of the export orientation of the enterprises.*

Internal stimuli for changing export orientation (Cavusgil and Nevin, 1981) are related to competence, products and excess capacity (free resources). Except for the last one, all of these factors usually require time to develop, or alternatively to change gradually. The external stimuli are related to factors such as competition in domestic and foreign markets, unsolicited orders,

change in border procedures (Miesenbock, 1988; Sullivan and Bauerschmidt, 1990). For a number of these factors fluctuations are more frequent and relatively larger than for the internal stimuli factors, therefore:

$H_{2,6}$ *External stimuli will dominate over internal stimuli in enterprises with irregular and intermittent change patterns, while internal stimuli will dominate over external stimuli for enterprises with incremental growth, incremental decline, and stable change patterns.*

4.4.3 Export orientation and ensuing change patterns

Since change patterns are conceptually developed for the first time in this study, very little guidance can be found in previous literature for this section. The approach is therefore exploratory, but building on onto and extending previous research and theory development[15]. This section will focus on the interrelationship between change patterns and the other measures of export orientation. The rationale for testing out these relationships, is that most of the 'conventional wisdom' on strategy and management underlines the importance of set objectives, determination and consistency for maximising performance (Porter, 1990; Mintzberg, 1998; Quinn and Voyer, 1998). On the other hand our deliberations points to the possible existence of intermittent or irregular change patterns. It would be an contradiction, and also very critical for the enterprises, if these are inferior and still commonly found. Therefore following hypothesis will be tested:

$H_{3,1}$ *Enterprises with stable or incremental growth change patterns of export quota will have a higher average export quota than enterprises with intermittent or irregular change patterns.*

Compliance with a gradual development model would imply that it is more difficult and requires more consistent effort to export to distant export markets than to neighbouring export markets (Reid, 1981; Holzmüller and Kas-

[15] An analysis of the temporal development of change patterns would be very interesting. Compliance with life cycle models of development would, for instance, mean that enterprises would develop their export sales and 'mature' in a sequence starting with an intermittent change pattern and moving through an irregular, an incremental growth, and a stable pattern ending up in an incremental decline pattern. Five observations and a time span of five years, however, are not sufficient to test any hypothesis regarding life cycles.

Kasper, 1990; Johanson, 1990). This would favour regular change patterns in distant export markets. Intermittent and irregular change patterns would more likely be found among enterprises which mainly operate in neighbouring export markets.

$H_{3,2}$ *Enterprises operating in distant export markets will have a greater propensity for stable or incremental growth change patterns than enterprises operating in near export markets. Enterprises with irregular and intermittent change patterns will operate predominantly in near export markets.*

4.4.4 Export orientation and total performance

The central point of possible existence of non-regular development patterns was addressed by hypothesis H_1. The other point of central interest stems from the line of reasoning which views engagement in exporting as a strategy for growth in total sales (Craig, 1993; Chetty and Hamilton, 1996). One could reason that regularity of exporting would be associated with commitment, which again has been found to be associated with superior performance (Cavusgil and Naor, 1987; Walters and Samiee, 1990).

In a study of exports in newly formed enterprises, Christensen and Jacobsen (1996) found that enterprises with continuing export had stronger growth in total sales than non-exporters. It is therefore of interest to ascertain whether enterprises with different export orientation display different growth rates in total sales. The most direct approach is to compare growth of export quota with growth in export sales;

$H_{4,1}$ *Growth in export quota will be positively correlated with growth in total sales.*

However, it is also very interesting to assess the relationship between the change patterns of export quota and total sales (Paasche and Solem, 1992). Following the same line of reasoning as above regarding the assumption of exporting as a growth strategy, consistent export development should lead to increased growth in total sales:

$H_{4,2}$ *Enterprises with stable or incremental growth change patterns of export quota will exhibit higher growth in total sales than enterprises with irregular or intermittent change patterns.*

4.4.5 Opportunistic behaviour patterns

The opportunistic behaviour patterns are in a 'pure' form characterised by enterprises actively searching for and seizing export opportunities without any preconceived, explicit and specific strategy for products and markets (Johnson and Scholes, 1993:39). If successful, such an opportunistic event may lead to a new strategy. The commonly found start-up of exporting as result of an unsolicited order (cf. Miesenbock, 1988) is a typical example of this.

The enterprises following such strategies will be reactive in the sense that they adapt to existing market conditions and opportunities. However, they are also proactive in the sense that they actively operate in the market, searching for market information and using such information creatively to approach new markets and product opportunities, see Table 3.2. As a transient phenomenon the reaction to opportunity may be one way of explaining emergent strategies (Johnson and Scholes, 1993:39, Mintzberg, 1998a:15). As a permanent operational feature such continuous reorientation in markets, cf. hypothesis H_1, would represent an inefficiency if it was associated with a similar volatility in the total output, see discussion of $H_{2,4}$ above.

Therefore, if the irregular and intermittent change patterns are permanent and not transient features, the enterprises in these categories must be able to maintain total stability and control of total sales (stable or incremental growth change patterns) while experiencing large fluctuations in export quota (intermittent or irregular change patterns). The fluctuations incurred by large variations of export quotas must be balanced by mechanisms at sub levels. This reasoning can be refuted by testing the following hypothesis:

H_5 *Enterprises with irregular or intermittent change patterns of export quota will have a high propensity for irregular or intermittent change patterns in growth of total sales.*

4.5 Alternative explanatory factors

The testing procedures will include some factors additional to those discussed in the outline of the hypotheses. The reasons are partly that the additional factors could provide alternative explanations, partly that they represent logical extensions of the theoretical discussions. At the present stage of theory development, the reason for including the last factors is to suggest areas for further research rather than to test theories.

A number of studies have pointed to the significant role of family ownership and family values for explaining development of enterprises (i.a. Donckels, 1996; Bornheim, 1997). A relationship has also been established between family ownership and various measures of internationalisation (Donckels and Aerts, 1998). Since family ownership is more typical for small than for large enterprises (Havnes *et. al.*, 1992, 1993), the ownership structure will be examined as a potential, alternative, explanatory factor.

External stimuli require interaction with the environment, and development of information structures has been identified as an important element of internationalisation strategies (Ahokangas, 1998). The roles of information channels or information systems are, however, neglected topics in the reviewed literature, see tables A2.1 and A2.2 in Appendix 2. The possible interaction between development of information channels and development of export orientation will therefore be explored as a potential, alternative, explanatory factor.

5 METHODOLOGY OF DATA COLLECTION

5.1 Data requirements

There is a close connection between the analyses to be made and requirement for data. This data requirement will be met through the proper selection of the population to be observed and by the instrument of data collection. There is a clear dependence between these two issues and the methodology of data collection, which can be deduced from the hypothesis and theoretical models outlined in Chapter 4.

The focus on an output-oriented model necessitates survey type data. Ideally this should come from a representative sample of small and medium sized enterprises. Included in this sample should be a fair number of exporters as well as non-exporters, all relevant sectors of manufacturing industries and a representative distribution of nationalities and sizes. In order to reduce the variance due to the effect of random occurrences of enterprises representing extreme values, the number of observed cases would need to be very high and the cost of the survey would be prohibitive.

The alternative is to reduce the sample in a systematic way which will ensure reduced variations during data analysis and statistically significant test results. The practical solution to this is to focus attention on specific and limited sub-sections of enterprises, i.e. a stratified sample. Within these strata, selection procedures should ensure that the resulting sample will be as close to random as practically possible.

The analytic model requires that the same measurements are repeated in each firm at all points of observation and that the progress over time of each measurement is monitored in each firm. These requirements necessitate a panel study, where each individual enterprise can be identified and followed throughout the period of observation.

Furthermore, the sample size must reflect the fact that statistical procedures require a minimum number of observations within each potential category or class of the analyses. Two important sources of depletion of the initial sample should be considered. Firstly, response rates of no more that 20% are typically what can be expected of mail surveys, see Appendix 2. Secondly, the same enterprises cannot be expected to respond each year. Thirdly, accumulated attrition rates of up to 40-50% can be expected over a four-year observation period (five observations) according to Storey (1994) and Isaksen and Spilling (1996).

5.2 Meeting the data requirements

The outlined model and hypotheses pose stringent requirements on the data collection instrument. As discussed above, mapping of development over time requires longitudinal data at enterprise level, tracking the development of individual enterprises. This combination of requirements implies panel data. As we have observed that all previous research has underlined the importance of multi-dimensional constructs, an extensive range of variables will also be required. The task of collecting data meeting these requirements is large, costly, and time consuming, which is the main reason for the lack of empirical research based on this type of data.

The tasks of reaching a sufficient population of enterprises and of applying an extensive questionnaire over a long time period are too large for one person, but may be overcome by an organisation. This has been the motivating idea behind the international research collaboration known as the Interstratos project, which has been chosen as the tool to overcome the practical problems of research on this scale. The Interstratos group, see Appendix 1, has been set up as a co-operation of researchers from eight countries with a common interest in strategies for the internationalisation of small and medium sized enterprises (SMEs). The main purpose has been to collect longitudinal data pertinent to analysing SME internationalisation. The author has been a member of the Interstratos group since 1991, project leader for the Norwegian participation, and responsible for collecting the Norwegian data.

The decision to use the Interatratos data set was the result of a process. This process had one 'internal' perspective directed towards the research questions and the objectives of the study. One alternative which was considered was to study a few enterprises in great detail over a long period of time in a case study approach. As the research objectives became focused through development of the research questions, it became clear that data from a large number of enterprises were required, which necessitated a survey approach.

Simultaneously, the discussions with colleagues from the Interstratos project provided 'external' input for this process, contributing to focusing the scope of the research as well as increasing the awareness of the total potential of the Interstratos data set.

Although the participants in the Interstratos group entered the project with different research models, the common themes of

- focus on SMEs,
- strategies for internationalisation,
- longitudinal development, and
- understanding of main mechanisms (see Figure 5.1),

ensure overlap between most of the central concepts, and hypothesised relationships. As a result of this similarity, extensive overlap was found between the variables used in this thesis and the variables used by the other researchers.

Thus, data collection could be efficiently performed by a common instrument, and data collected by colleagues in other countries could advantageously be made available to all participants. The co-operation of the Interstratos group has provided the necessary administrative structure for controlling data collection over a large geographic area and over a long period of time. Without such co-operation, the sample would have been limited to one country.

The negative effect of co-ordinated data collection is that compromises have to be made, mostly in order to limit the number of questions in the questionnaire. Even so, it is evident that the final questionnaire includes more questions than the individual researcher would include for his or her purpose alone[16].

In this co-operative effort, each researcher has contributed to the process of establishing the questionnaire. Furthermore, the responsibility for selection of national samples have been delegated to the national groups. These have been responsible for conducting the yearly national surveys, coding of responses, and initial control of data registration. The author was responsible for these activities in Norway. The individual researcher has personal responsibility for her or his own research and for the use of the data in this respect. The Interstratos group shares the responsibility for ensuring compatibility of data throughout the international data set. This has been achieved through two project meetings each year with participation of all members of the project group.

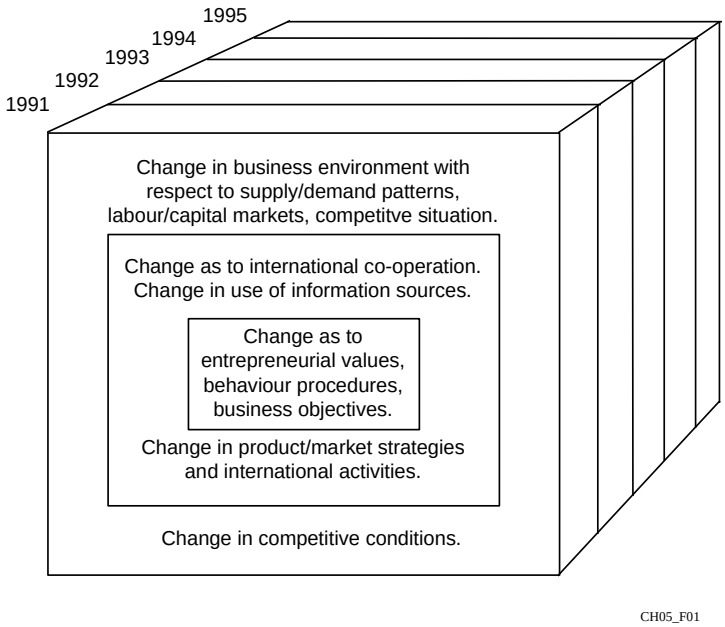
[16] This actually also has positive effects. As always in research projects, analyses disclose problems that were not foreseen or given enough weight at planning stages. Data provided through the questions supplied by other researchers often turn out to be useful to illuminate such unforeseen problems.

5.3 Procedure for establishing the questionnaire

5.3.1 Main research model

The Interstratos research model is a conceptual model incorporating the detailed models of each researcher. The Interstratos model depicts enterprises as open systems operating in an environment defined by supply and demand situations for resources, demand for products, regulations by governments and activities of competitors (Haahti, 1993). These elements constitute the competitive conditions of the enterprises.

Figure 5.1 Interstratos frame of reference model[17]



The consequence of the dynamic approach is that the model focuses on changes and change processes.

The enterprises, often personified by the entrepreneurs, have characteristic attributes related to generic properties such as nationality and industry sec-

[17] (Haahti, 1993:2)

tors, but are also characterised by internal resources, products, type of production systems, competence, etc. The choices and activities of the enterprises are further perceived as being strongly influenced by values and attitudes of the decision maker in addition to her or his competence and capabilities. The interaction of the external competitive conditions and utilisation of internal resources determines the competitive position of the enterprise.

Importantly, the enterprises are seen as having the ability and possibility of making strategic choices to influence their short and long-term competitive positions. Information provided through interaction and co-operation with external parties provides important input for the decision process.

5.3.2 Main concepts

The main concepts delineate the questionnaire and the variables. This section will give an overview of the total Interstratos questionnaire and point out the sections with deviations from the line of questioning that would have been followed if only the present research model had been taken into account. There is now also an opportunity to make *a posteriori* reflections on the number of questions, their phrasing, and measuring scales. This is a different issue which is discussed in Chapter 9.

The questionnaire is edited around eight main concepts:

Enterprise characteristics includes a unique identification of each enterprise to enable analyses at panel level. This concept also encompasses the generic properties, such as nationality, industry sector, ownership and legal structure. In addition variables are included to record employment, product specialisation and organisation of the manufacturing line.

This section of the questions is the same as it would have been if it had been specially customised for testing the present hypotheses.

Assessment of success factors gives the managers' perception of the importance of a range of potential success factors, including identification of the most important success factor. This concept is not used in the present thesis.

Specialisation in products and markets defines the number and focus of products and markets. This concept also includes measures of the value of total sales, export sales and sales on local markets.

No compromise has been made in this section regarding phrasing of questions or the measuring scales. There is, however, always a problem when comparing items related to accounting or economic values across currencies

and over time. This problem is intrinsic to the issue and not a consequence of the approach to organising data collection.

Assessed changes in markets previous year once again records the assessment of the manager. The focus is changes in markets for labour, supplies and finance, as well as markets for the products of the enterprise. This concept is not used in this thesis.

Assessed changes in competitive position previous year focuses on areas where the enterprise has experienced changes in competition, how this is influenced by organisation of markets, and changes in competitive position vis à vis suppliers or customers. The changes in competitive position are recorded separately for domestic and foreign markets. This concept is not used in this thesis.

Orientation towards international markets and international operation previous year is the most extensive of the concepts. It addresses the organisation of the distribution channels, the countries where export and import markets are found, the entry modes, forms of co-operation and choice of domestic or foreign partners. Finally, assessments are given of factors in favour or disfavour of internationalisation.

The questions on distribution channels and forms of co-operation are more detailed than what is required for the present model. The solution has been to aggregate responses over several multiple response questions and control questions. This produced well defined and adequate categorical variables.

The questions mapping the factors in favour and disfavour of internationalisation are used to identify external and internal stimuli for exporting. The wording chosen in the questionnaire deviated to some extent from what would have been chosen for the purpose of this study alone. The consequence is probably reduced precision, but it is impossible to assess what the total effect is.

Sources and types of information on internationalisation records topics of information and which external sources of information and knowledge have been used during the previous year. Specifically, differentiation is made between use of domestic and foreign sources of information.

Once again the questions on this item are more detailed than what is required for the present model. The solution was the same as above, aggregating responses over several multiple response questions and control questions. This produced well defined and adequate categorical variables.

Personal characteristics and attitudes of the manager/entrepreneur addresses experiential as well as formal knowledge of the entrepreneur along

with age and gender. This concept also includes a set of 12 statements where the manager is asked to indicate the degree of agreement in order to map attitudes.

The questions related to characteristics and competencies of the entrepreneur are much in line with the specific requirements of the present model. The line of questions mapping the attitude of the manager is strongly influenced by the priorities of the other members of the Interstratos group. The consequence is inadequate and not sufficiently precise measures of motivations for exporting, willingness for risk taking, and openness to change.

There is also the question of whether or not attitudinal measures can be compared across language and cultural boundaries. This is again a question of method, and not an issue related to the organisation of data collection.

5.3.3 Measures and scales

The complete list of variables used to measure the concepts used in the thesis are specified in Appendix 3. In general, assessments are given on five or three point ordinal scales. A large number of descriptive data are given in dichotomous format as well as categorical values, such as name of country.

One specific problem is associated with performance measures. There is an obvious need to assess success, and the most relevant measure would be profit. However, with enterprises from different countries with different laws and practices regulating accounting, profit would constitute a very ambiguous measure. Total sales and change in total sales have therefore been chosen as economic performance measures.

A second problem arises when comparing economic data of enterprises in different countries. The solution in the Interstratos project has been to convert sales figures in domestic currency to ECU. The comparisons of this thesis, however, are made longitudinally within the same enterprise, and mostly expressed as change indexes. Fluctuations in exchange rates between national currencies and ECU would potentially influence the longitudinal panel comparisons. The values of total sales and export sales have therefore been converted back to domestic currencies, using the same exchange rates as initially used when establishing the consolidated data sets, see Appendix 1, Table A1.5.

5.3.4 Translation of the questionnaire

The original questionnaire was made in English with translation to the languages of the different countries. The national groups have been responsible

for this translation. Accuracy was assured by blind translation back to English. However, the discussions of the Interstratos meetings have time and time again illuminated the problems of direct translation, the significance of the context of the questions, and the relevance of questions in different countries.

5.4 Data collecting procedure

5.4.1 Selection of the sample

All countries have used a common set of guidelines for selection of the sample of enterprises. First of all, the national samples have been stratified in five size classes from 1 to 499[18] employees with intended equal number of enterprises in each size class. The rationale has been to ensure a sufficient number of the largest enterprises, which would hardly have been represented if random selection alone had been used.

Secondly, the sample has been drawn from five pre-defined sectors within manufacturing industries defined at two digit NACE level, see Appendix 1. The purpose of this has been to have a controlled reduction of the variation of the data set while ensuring the possibility of elucidating the effects of technology.

These two dimensions of stratification at national level, each with five categories, define 25 'cells' of combinations. Within these 'cells' random samples have been drawn intentionally of 100 enterprises. The procedures for drawing these samples have been adapted to the practical situation in each country. At one extreme the Norwegian sample was drawn by the National Bureau of Statistics from their database of all Norwegian enterprises in accordance with our specifications as to size categories and NACE categories. The other extreme is represented by the British situation where no central database of enterprises is available and the sample must be drawn from various address lists, where none can be regarded as complete. Another practical limitation is represented by the fact that in some of the small countries, fewer than 100 enterprises were actually available within each cell.

The final guideline for selection of the sample has been to maintain the initial address list throughout the five-year observation period. The purpose of

[18] At the time of starting the project, this constituted the size range for the EU definition of SMEs. Later the defined maximum size of SMEs has been reduced by the EU to 249 employees (ENSR, 1996:51).

this has been to maximise the possibilities of following development within individual enterprises over the total period.

With these limitations the initial samples (address lists) of between 2000 and 2500 enterprises in each country have been made, totalling ca. 18000 enterprises for the whole project.

5.4.2 Yearly national surveys

The national surveys were performed in each of the years 1991 - 1995.

The questionnaires were mailed with pre-addressed and pre-paid return envelopes included. All countries have used telephone reminders, two wave mailing, or a combination of both, to ensure acceptable response rates. All countries also included a letter describing the project with a recommendation from an appropriate authority. The actual response rates indicate national differences as to the propensity to respond to questionnaires.

The yearly surveys used a fixed reference date (January 10th) for all types of status data, such as employment. All results and changes, actual or assessed, were similarly referenced to the previous calendar year. In this way compatibility of data longitudinally and across countries was maintained although the exact survey dates differed.

Each country developed coding books according to the actual lay-out of the national questionnaires. However, the coding of each variable was maintained strictly within the definitions of the Interstratos variable and record description[19]. The initial control of coding was made at national level before transferring the data to centralised consolidation by the Austrian partner on behalf of the Interstratos group. Consolidation has been possible because identical record structures have been used in reporting and transferring the national data.

5.5 Consolidation of data

Without use of the enterprise identification the consolidated yearly data sets constitute five cross-sectional data sets, with identical and well-defined composition from a statistical point of view. As such these give unique possibilities for a wide range of longitudinal analyses of development at group level.

[19] A copy of the Norwegian coding book (in Norwegian) and of the Interstratos Record Description (1996) are available from the author on request.

5.5.1 Identification of enterprises

Each country has assigned an identification number to each enterprise which, together with country identification, provides an opportunity to combine data from the same enterprises over all observations. The same variables also allow identification of enterprises as belonging to the panel sample, see below.

5.5.2 Consistency control

The consolidation process started with a central consistency control performed at two levels. First of all there has been a (renewed) control of the data range for each variable. There then followed a logic plausibility control for pre-defined groups of variables. Whenever data records were not accepted by these controls, survey forms were rechecked by the national groups and if necessary entries were corrected.

A third level of consistency control has been performed after initial descriptive analyses revealed outliers which have given cause for renewed control against survey forms. Thus, the consolidated data set for all years was finalised in November 1996.

5.5.3 Missing countries and observations

During the project financing became a problem for some of the partners. The practical consequence has been that the British partner was not able to provide data from more than two years, and the Dutch partner was not able to conduct the planned survey for 1994. The British enterprises are therefore not included in the panel sample. In this thesis the four Dutch observations are included, thus defining a 'panel firm' as a firm that has participated in four or five surveys. The justification for this delimitation of the panel sample is further deliberated in Chapter 7 and Appendix 4.

5.6 Outline of the data set

The main descriptive statistics for the total data set are presented in Appendix 1. The high number of variables prohibits full documentation of all variables used in the thesis. However, details are available from the author on request.

Table 5.1 outlines the sample and illustrates the national differences in the propensity to respond to questionnaires. This tendency is strengthened when multiple responses are required for the firms included in the panel.

Table 5.1 Number of observed enterprises over the five years of Interstratos project.

	Number of observations per enterprise											
							Panel sample					
	1		2		3		4		5		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Austria	641	11	480	22	335	29	359	40	323	40	213	20
Belgium	682	12	218	10	103	9	48	5	15	2	106	10
Netherlands	2822	49	523	24	89	8	20	2	0	0	345	32
Switzerland	485	8	250	11	143	12	102	11	89	11	106	10
Norway	359	6	187	9	130	11	83	9	62	8	8	7
Sweden	465	8	341	16	242	21	220	25	260	33	152	14
Finland	316	6	184	8	120	10	74	8	45	6	7	7
Total	5770	100	2183	100	1162	100	906	100	794	100	10815	100

Table 5.2 gives an overview of the distribution of enterprises in the 25 ‘cells’ defined by the stratification according to industry sectors and size classes. The table is based on size class categories in 1991.

The intended even distribution of enterprises would mean 4% of the enterprises should be found in each cell. The actual numbers indicate a slight over-representation of the smallest enterprises at the expense of the two largest size categories. There is also a slight over-representation of enterprises from the mechanical industry sector and of the wood and furniture sector. Quite significantly, the distribution of enterprises from the total data set and the distribution of enterprises in the panel data set are very similar. There is no indication that the panel data set is different from the total data set when judged by the stratification variables.

Table 5.2 Cross tabulation of size classes and industry sector - 1991 categories. Cell total in number (N) and percent of table total(%).

Size class,	*TEXT*		*ELEC*		*FOOD*		*WOOD*		*MECH*		*Total*	
employees	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Total sample												
1-9	369	8	169	4	262	6	303	7	311	7	1414	31
10-19	160	4	121	3	163	4	226	5	226	5	896	20
20- 49	200	4	174	4	166	4	212	5	280	6	1032	23
50- 99	104	2	101	2	111	2	109	2	195	4	620	14
100-499	96	2	118	3	117	3	72	2	183	4	586	13
Total	929	20	683	15	819	18	922	20	1195	26	4548	100
Panel firms												
1-9	93	7	44	3	86	6	114	9	105	8	442	33
10-19	35	3	42	3	62	5	75	6	59	4	273	21
20- 49	51	4	45	3	57	4	70	5	84	6	307	23
50- 99	17	1	30	2	29	2	36	3	56	4	168	13
100-499	25	2	26	2	30	2	17	1	46	3	144	11
Total	221	17	187	14	264	20	312	23	350	26	1334	100

5.7 Ideal versus available data

There is generally a gap between reality and our desires. So is also the situation with the available data. The ideal situation would be to specify a model, deduce all relevant measures of each concept and express these as questions that would be perfectly understood by all the respondents. The respondents would, likewise, constitute a perfectly representative sample of a perfectly defined population. Some of the practical consequences of deviations from the ideal situation are common to all research. Some of the 'deviation costs' of this study are the consequences of selecting to use the Interstratos data set. These can be assessed before analysing the data.

The problems associated with using data from different countries should never be under-estimated. Once the decision has been made to include the cross-cultural perspective, represented by respondents from different countries, the problems of understanding questions and interpreting responses have already been accepted. The fact that the Interstratos project group had native researchers from all countries reduced, but did not eliminate, the

cross-cultural interpretation problem. However, this is not a problem arising from the fact that Interstratos data were used; it is a common problem for all cross-cultural research[20].

Other sides of this issue are addressed as part of the discussion of validity and reliability in Chapter 9.

[20] In addition to the problems related to interpretation of questions, there are also indications that reference points of scales measuring values may differ between countries.

6 MEASUREMENT MODEL

6.1 Introduction

As discussed above, earlier empirical research has serious shortcomings. The majority of the studies:

- are cross-sectional and provide very limited insight into the dynamics of the internationalisation process, and
- are dominated by univariate analyses and provide very limited insights into reciprocal relationships between the variables.

In attempting to remedy this, the present study is confronted with the consequences of pursuing a multi-dimensional and longitudinal model. The ensuing analytical model is very complex due to:

- a large number of concepts,
- a large number of measures,
- measures representing incommensurable dimensions of concepts ,
- reciprocal relationships.

Previous research, as discussed above, offers little guidance as to structuring of the analytical model. The analyses will therefore of necessity include elements of exploratory research in addition to the confirmatory elements belonging to hypothesis testing. Two main objectives of the exploratory part of the analysis will be data reduction and identification of patterns of relationships that are stable over time.

The analytical part has therefore four distinct steps:

1. Establishing a theoretical measurement model to test the hypotheses developed in Chapter 2; based on previous research as discussed and developed in Chapters 3 and 4, see Figures 4.4 and 4.5. This model will also explicate the exogenous variables.
2. Data reduction through
   - 2.1. factor analysis
   - 2.2. multi-dimensional combinations of variables into complex constructs

3. Distinguishing between patterns of relationships between exogenous variables that are
   - 3.1. circumstantial or
   - 3.2. temporally stable
4. Structural equation analyses in two steps
   - 4.1. establishing a measurement model, following up data reduction and analyses of temporal patterns
   - 4.2. final testing of total model fit.

In this chapter the theoretical measurement model of step one will be established. Steps two to four will be developed as parts of the data analysis in Chapter 7.

The theoretical measurement model defines a hierarchy starting with the concepts, then defining their elements, and finally listing the variables which provide the actual measures. The complete list of variables can be found in Appendix 3.

The second stage starts with the actual data and involves the problem of data reduction. One method used at this stage is factor analysis, which needs to be addressed specifically due to the problem of stability in factor composition in panel data, see below. Some concepts require other approaches to data reduction, such as establishing measures by the generation of multidimensional indexes. The result from the work at this stage will be the empirical measurement model, which may be different from the theoretical model. The empirical measurement model will prepare the data on a format which is suitable for the causal analyses.

6.2 Theoretical measurement model

6.2.1 Enterprise/Entrepreneur (EN_i)

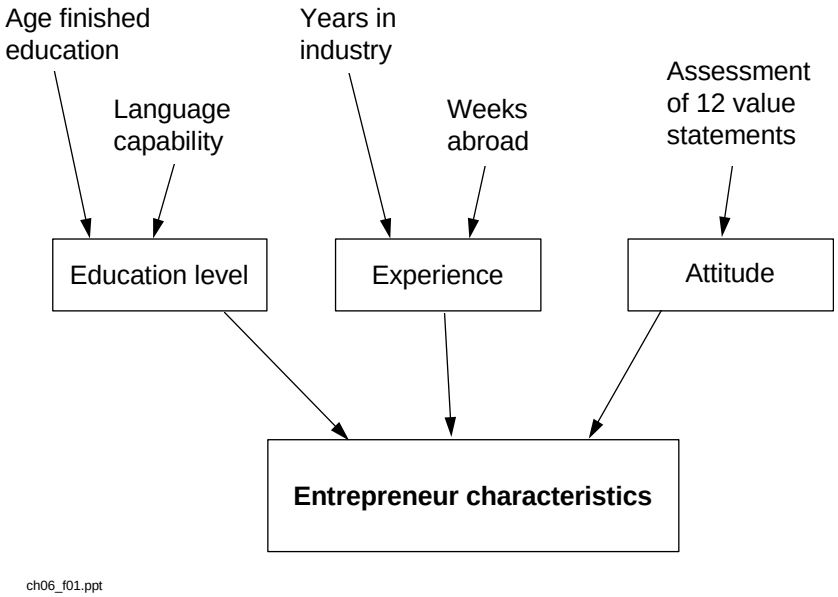
As discussed above, the two elements, enterprise and entrepreneur, of this concept are principally different but in practice very strongly correlated, due to the often dominating role of the manager/entrepreneur of the small enterprise. The theoretical measurement model will initially deal with these two elements separately for the purpose of clarity, and converge the two concepts in the next stage.

Entrepreneur characteristics

The entrepreneur characteristics are defined by three main elements: education level, experience and attitude. Education level has two measures: age when the manager completed full-time education, and language capability of the management team. Experience is measured by years in present industry by manager, and weeks abroad by manager over the past three years. Finally there is a set of 12 varied value statements to be assessed by the manager. The total structure is depicted in Figure 6.1.

The complete definitions of the 16 variables initially used to measure entrepreneur characteristics are defined in Appendix 3.

Figure 6.1 Entrepreneur characteristics, theoretical measurement model



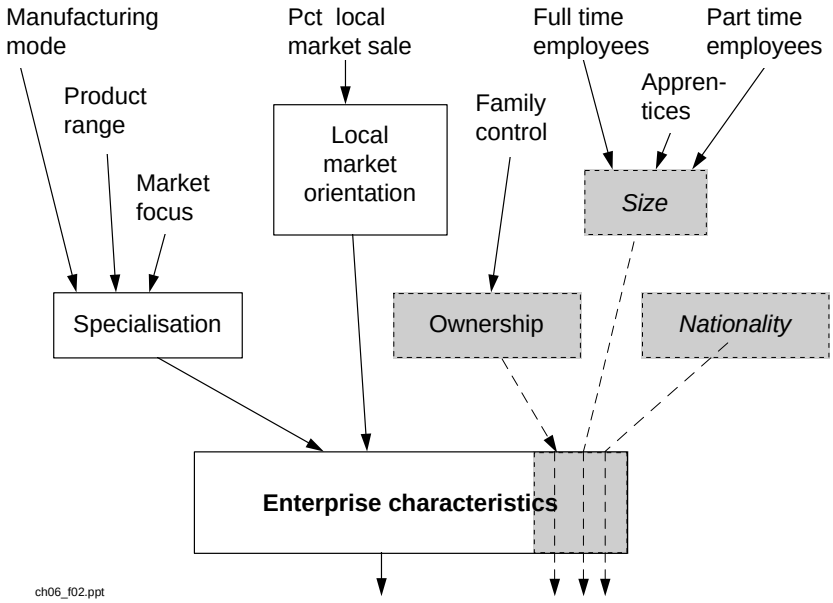
Enterprise characteristics

Five separate elements constitute the enterprise characteristics. Three of these elements, enterprise *size* (EMP employment, computed variable), enterprise *nationality* (V101), and ownership[21] define categories which are in-

[21] 'Legal form' is often seen as one dimension of 'ownership'. However, legal form is most often decided by specific national legislation related to taxation, liability, subvention, etc.;

cluded directly in the hypotheses to be tested. These will therefore be kept separate from the compounded measure of the concept 'enterprise characteristics'. The remaining elements, which are included in the measurement of enterprise characteristics, are specialisation and local market orientation. The structure of the remaining variables is illustrated by Figure 6.2.

Figure 6.2 Enterprise characteristics; theoretical measurement model



Specialisation

Specialisation has three main components:

Manufacturing mode provides a measure for the specialisation of the manufacturing system, that is to which extent the manufacturing system is specially adapted for specific products. Mass production represents a high degree of specialisation, batch production less specialisation, while individual

not by operational considerations. The combined effects of these elements are best reflected by 'nationality'.

production represents the lowest degree of specialisation of the manufacturing system.

Product range is the second component of specialisation. Manufacturing for stock and later sale requires general products, while manufacturing to order allows highly specialised products. Components for stock and later final assembly represent a median of product specialisation. The other essential part of product specialisation is represented by the number of products and the degree of focusing on a few main products.

Market focus is the last component of specialisation. The first element of market focus is the number of customers and the extent to which the enterprise concentrates on the three most important of these. The second element relates to the extent of similar or different requirements from the customers.

Local market orientation

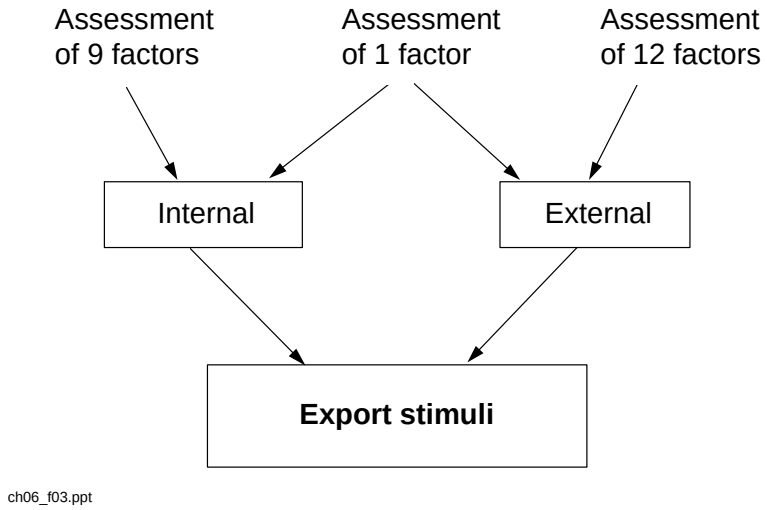
The measure of local market orientation is simply the percentage of total sales delivered to customers within a radius of 50 km from the enterprise[22].

6.2.2 Export stimuli (ST_i)

The measurement model of export stimuli is quite simple, as depicted by Figure 6.3. There are a number (22) of factors that may potentially be effective. Twelve of these may be classified as belonging to the external environment of the enterprise, nine factors relate to internal conditions of the enterprise, while one factor relates both to external and internal conditions.

[22] The measure does not take into account the possibility of a nearby border, which in any case would be applicable only to a very small minority of the participating enterprises.

Figure 6.3 Export stimuli; theoretical measurement model



The complete list and definitions of the factors, which may potentially function as export stimuli, are given in Appendix 3. For identification of assumed internal and external factors, see Appendix 3, Table A3.4.

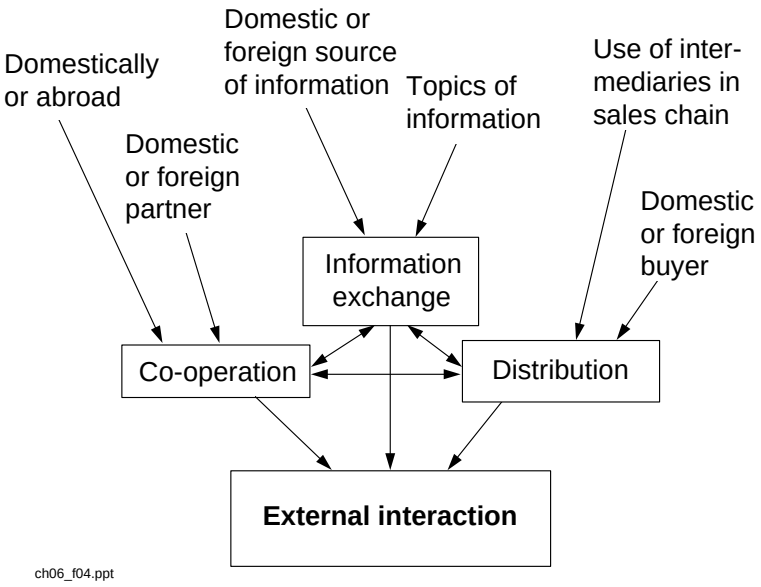
6.2.3 External interaction (IN_i)

The measure of external interaction has three main elements. These represent three areas of interaction, which partly are complementary and interacting. The most obvious dimension of external interaction is the *distribution* systems for raw materials and end products. These systems are competitive factors in the value adding process. At the same time the distribution system delimits the markets available to the enterprise. Parallel to the flow of raw materials, products and services, there is also a flow of information directly related to these and to the markets. Separated from this distribution system there is an intelligence system, *information exchange,* where information is acquired and exchanged at various more or less formalised 'meeting places' or 'information sources' - but not related to existing markets. Thirdly, many enterprises have relationships with other enterprises which are more committing and last longer than usual for the exchange of products. *Co-operation* is very often defined contractually, but may also be based on trust and established relationships. In practice, these three elements are closely related, as indicated in the figure.

Distribution systems

The distribution element has two main factors. The first factor relates to the existence of *intermediaries* in the distribution chain, such as agents, distributors or other companies using the products as components of their own end products. Such intermediaries will most often reduce investments and risk, and influence the cost efficiency of the distribution chain; but also function as filters in the information flow.

Figure 6.4 External interaction; theoretical measurement model



The other factor relates to the location of the customer or the intermediary, domestically or abroad. It may be assumed that a domestic customer or intermediary will not stimulate an international outlook or approach to the same extent as doing business directly with or through a foreign counterpart.

Co-operation

In addition to trading of raw materials and end products, enterprises interact with each other through various forms of co-operation with the purpose of internationalisation of activities. The *object* as well as the *partner* of this co-operation may be located domestically or abroad. The objective of co-

operation may range from market activities and product development to manufacturing and administrative functions. One special objective is associated with sub-supplier relationships, either on the supply side or on the product side. This factor could alternatively be regarded as one dimension of the distribution element.

Information exchange

Both distribution and co-operation are based on extensive flow of information. In addition the enterprise, more or less actively, searches for and uses information from other sources. Aside from the *topic* of this information, there are qualitative differences depending on whether the *source* of information is located domestically or abroad.

A total of 27 variables are used to measure external interaction.

6.2.4 Export orientation (EO_i)

The export orientation process takes place over a period of time. The outcome of this process is a change in the export orientation of the enterprise, as discussed in Chapter 4. Three elements will be used to monitor the change in export orientation: the extent of *export sales*, the *export markets*, and the *regularity* of exporting activities.

Export sales

Export sales volume is expressed in two different terms: the total value of *export sales* per year as an absolute measure; and the value of export sales as a percentage of total sales per year, *export quota*, as a relative measure. For both measures values in national currencies are used. In addition the dichotomous measure exporter/non-exporter is used in some analyses.

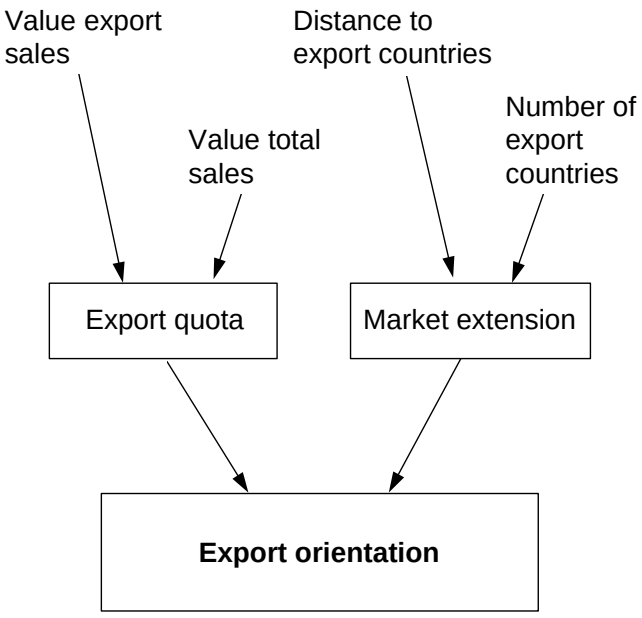
Market extension

There are two dimensions to the export market element. The first relates to the *distance* to markets where an analogy to concentric 'circles' is used to normalise 'distances' from the different countries. Domestic markets constitute the inner circle, followed by neighbouring countries, other European countries, and the world markets outside Europe as the outer circle. This measure is applied to the 'most important' export country.

The second measure is the *number* of countries to which the enterprise had export sales during the past year.

In combination these two variables capture the most important aspects of the extension of the export market, see Section 6.5 for a more detailed discussion.

Figure 6.5 Export orientation, theoretical measurement model



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6.2.5 Performance (TP_i)

Total sales

A number of variables are relevant as measures of enterprise performance. However, *total sales* or the change in total sales, will to a large extent reflect the aggregate effect of all the other measures, cf. discussion in Section 4.2.

Export regularity

Export regularity pertains to the dynamics of development of export sales. This measure is discussed in detail in Section 4.1.3 and analysed in Chapter 7. Export regularity depicts total performance at the level of the five-year observation period, see more detailed discussion in Section 6.7.

6.3 Dynamic aspects

6.3.1 Continuity in measures and concepts

The dynamics properties of the theoretical measurement model is realised by integrating the various sub-models discussed in this chapter in accordance with Figure 4.6. There is, however, the additional feature of stability of the factors. Data reduction through factor analysis as well as the LISREL measurement model (Bollen, 1989; Jöreskog and Sörbom, 1995; Hair *et al.*, 1995) is based on correlation or covariance between variables. The observed common features, measured by common correlation or covariance, are attributed to assumed common factors, also called latent variables in the LISREL model. These common features may, however, be circumstantial: found at one point of time but not at others. In cross-sectional analyses such circumstantial correlation or covariance may not be identified. Their effects may at best be observed as error terms or variance in subsequent analysis.

Since observations are made at five different points in time in this study, it is possible to identify combination of variables which exhibit common covariation or correlation properties over time. These will be termed ‘stable patterns of variables’. One major objective of the data reduction will be to identify stable patterns of variables which will be used in the later causal analyses.

6.3.2 Depicting changes

As discussed in Section 4.1.3, there are other possible modes of development of enterprises than incremental growth. Five categories of change patterns

were described for first order and second order change patterns respectively. The procedures for establishing the categorical measures for these categories are outlined here.

The main problem concerning the dynamic aspects is to define concepts that may capture and illuminate the characteristics of the changes over the period of observation. The approach chosen here is to define mutually exclusive and all exhaustive typologies of change patterns; and to assign each enterprise to one typology. As opposed to the other parts of the analyses, this approach requires use of the full time series for each enterprise. There are not enough observations to identify any shifts in change patterns[23].

As discussed in Chapter 4, two levels of change will be addressed here. First order change patterns are linear and defined by two observations. Second order change patterns can be non-linear and require three or more observations. Second order change patterns can also be seen as combinations of consecutive first order change patterns.

Changes are results of processes which require time. Time will therefore always be a critical element of studies of change processes. The length of the intervals between observations is crucial for interpretation of the magnitude of change.

The panel study comprises a total of five observations for each enterprise. The number of enterprises available for the analyses increases significantly if it is accepted that there is a 'missing value' for one or several of these observations. In such cases changes over two (or more) intervals will be used.

6.3.3 First and second order change patterns

The first step will be to classify the enterprises according to *first order* change patterns. For this purpose change rates of exporting will be calculated for all pairs of observations for two purposes. This allows first of all the inclusion of cases with possible missing observations, and secondly the introduction of limitations to the long-term growth which can be acceptable in the stable category.

The discrimination criterion will be change rates as defined in Appendix 4.

The *second order* change patterns are established by assessing the combinations of first order change patterns for each enterprise. Each typology of change pattern is recognised by a unique combination of first order changes.

[23] Shifts in change pattern will constitute third order change patterns.

That is, the incremental growth category encompasses all enterprises that display stability or growth in all intervals.

6.3.4 Stable enterprises

The classification of first order changes is based on the concept of stability with the addition of starting and stopping. A depiction of the dynamics must therefore be based on an understanding of stability.

The observations of total sales and export sales are the accumulated sales during the previous year. The proxy for degree of internationalisation (see 4.1.1) is export quota, the ratio of export sales and total sales each year.

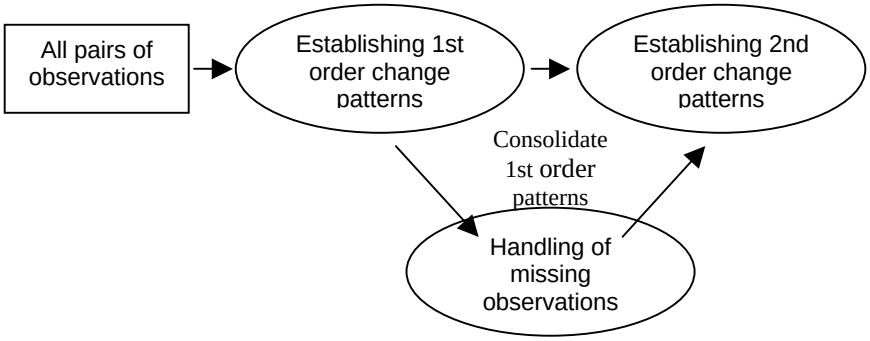
Relative measures of change will be used throughout the thesis. Changes will then be expressed as the coefficient:

$$\Delta x_{12} = \frac{x_2}{x_1} \qquad [6.1]$$

where the indexes identify the year. The change measure defines a change rate. By substituting the value 0 with the value 0.0000001 for the variable this change coefficient will always be valid while maintaining the possibility of unique identification of instances where the counter or the denominator originally had value 0 (zero), see discussion in Appendix 1. The interpretation of the resulting scale for changes is therefore:

$\Delta x <<$	1	signifies stopping
$\Delta x <$	1	signifies decline
$\Delta x =$	1	signifies stability, no change
$\Delta x >$	1	signifies growth
$\Delta x >>$	1	signifies starting

Figure 6.6 Establishing typologies of change patterns



6.3.5 Handling random fluctuations

The idealised definition of stability given above, $\Delta x = 1$, is not suited for practical purposes. The reason for this is that there will always be random fluctuations around a mean value. Enterprises adapt to this type of variation at operational level through the slack that is always part of business operations. At some rate of variation ($\Delta x \neq 1$), however, the oscillations or fluctuations become so large that they require special attention. The operational characteristics of each enterprise and its environment decide where the line delineating 'random variation' and 'change' should be drawn. For the purpose of this thesis three 'tolerance bands' defining the width of the stable category will be tested out:

Operational limits of random fluctuations	Reference coefficient, s[24]
± 10%	0.1
± 20%	0.2
± 30%	0.3

The rationale for this definition of the stable category is further deliberated in Appendix 4.

[24] $s = | 1 - \Delta x |$

6.3.6 Factor analysis under dynamic conditions

Factor analysis as a method for data reduction is well tested, but usually encountered in static situations where all variables are observed at one point in time. In a longitudinal test situation several observations of the same variables, factors, and concepts will be used. When used in further statistical analyses or when a model is developed to represent consolidation of variables in factors or concepts, it is vital that the same variables are included in each factor or concept at all points of time.

The factors represent patterns or constellations of correlation between the variables. However, it is quite probable that some of the constellations among variables are functions of time or even circumstantial. In some situations correlation may appear because observations were made at one specific moment, see discussion in Section 4.1.3. Later or earlier observations could have provided different results. Other constellations may represent 'genuine' relationships, meaning that they are stable over time.

Correlation which are found among variables at one observation but not in others, may be regarded as transient. The corresponding factors may be termed 'transient factors'. Correlation, and corresponding factors, which are stable over all observations, may be regarded as being 'stable'. It should be underlined that *transient* and *stable* are relative concepts. What appears to be a stable constellation of correlation at one period of observation may turn out to be transient if the length of the period is extended.

The practical implications of the difference between transient and stable factors will be demonstrated in the factor analyses in the next chapter.

6.4 External interaction

Enterprises have three distinct interaction channels, see Figure 6.4. These may develop independently, but there are also reasons to expect strong interrelationships between these channels. The purpose of this thesis is not to explore the relative importance of different channels, nor to measure the exact impact of external interaction on export orientation. The purpose is to explore causality which, from an analytical point of view, necessitates establishing co-variation and the time order of co-variation.

For this purpose an *index of external interaction*, is developed along the same principles as for the index of specialisation, see Section 7.2.3 and Appendix 5.

This operationalisation will ensure that the index of external interaction, *exin*, has values between 0 and 1. Extensive external interaction, the use of

many channels, and the use of channels with foreign end point will all contribute to increasing the value of *exin*. Limited external interaction, the use of few channels, and the use of channels with domestic end points will contribute to decreasing the value of *exin*.

The details of calculation of *exin* are found in Section A5.3 of Appendix 5.

6.5 Market extension

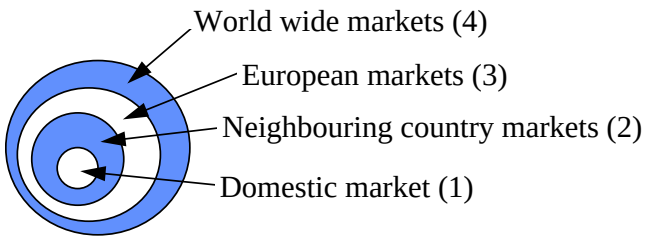
In previous sections two important dimensions of export orientation have been discussed: the share of export sales relative to total sales, *export quota*, and the measure of dynamic behaviour, *export regularity*.

A third dimension is represented by the *export market extension*, reflecting the capability as well as the propensity dimensions of export orientation. Two different measures are used for this concept. The first is the number of export markets where the enterprise is actively operating. Operation on one export market is less demanding, and carries less risk, but also has less potential than operating on several export markets. The second measure relates to the distances to markets. Operating on nearby export markets is far less demanding and less costly than operating on very distant markets.

The number of export markets is a simple measure, obtained by a counting procedure.

Distance to the most distant export market is measured on an ordinal scale by defining categories of markets ranging from domestic markets (1) to world wide markets (2), see Figure 6.7 and further deliberation in Appendix 5, Section A5.4. This conceptualisation defines a distance scale where markets are ordered as circles within circles.

Figure 6.7 Categories of export markets



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For the measure of export orientation a composite market index is created from these two measures of export markets:

Market extension =

(Number of export markets)×(Distance category of most distant export market)

The final causal model is set up to analyse changes over time. Thus the actual measure included in the models is the change index for market extension over the observation interval:

$$mext_{1,2} = \frac{mext_2}{mext_1} = \frac{dist_2}{dist_1} \cdot \frac{nmark_2}{nmark_1} \qquad [6.2]$$

Values of market extension index larger than 1 indicate expanding markets, either in the number of market countries or in greater distance to most distant export market. Values lower than one indicate retraction from export markets.

6.6 Home region of enterprises

Market, cultural, and legal aspects of the enterprise environment are associated with the nationality of their domicile. In subsequent analyses the variables *nationality* (seven categories), *industry sector* (five categories), and *family ownership* (two categories) with possible interactions will be studied, opening for a total of 70 possible combinations. It is necessary to increase the number of valid observations within each 'cell' of possible combinations, and also to compensate for large variations in the number of cases for each country.

For these reasons, the variable *nationality* has been recoded into the variable *region* with three categories: Central - comprising Austria and Switzerland; BeNe - comprising Belgium and the Netherlands; and Nord - comprising Finland, Norway and Sweden. See Appendix 6.

6.7 Performance

Two measures of total performance are included in the causal model. The first is change in total sales, measured in national currency. This measure is strongly correlated to growth in employment, see Appendix 5, Section A5.5. The second measure is export regularity, see Section 7.1, which gives an important insight into the temporal variations of commitment to exporting. The

possibility of interaction between these two measures cannot be excluded, which necessitates simultaneous analyses.

The possible interaction of the change patterns of export quota and of total sales is analysed in Section A4.5 of Appendix 4. As set out in Table A4.10 no systematic interaction can be found between these two measures of total performance.

7 EMPIRICAL MEASUREMENT MODEL

When moving from the theoretical to the empirical measurement model, two main issues emerge, both related to depiction of changes. The first issue concerns the definitions and procedures to follow in order to delineate unequivocally and meaningfully typologies of change patterns. The second issue concerns the special problems related to data reduction of panel data.

This chapter will focus on these two issues. The development patterns will be explored in Section 7.1. The various approaches for data reduction are presented in Sections 7.2 to 7.4, while the final measurement model is presented in Section 7.5. The majority of the results will be presented in the appendices with reference from the appropriate places in the text. Analyses of possible explanations and causalities will be the focus of Chapter 8.

7.1 Development patterns in export regularity

7.1.1 Changes in export quota

First order change model of export quota

The first order change model for export quota is always based on pairs of observations (see Section 6.3), and is depicted in Table 7.2. The categories of the table are based on the quotients of export rates at the two points of observation, year 1 and year 2. The definitions set out in Figure 7.1 are used.

In a complete panel year 1 and year 2 will be succeeding years (e.g. 1991 and 1992). To allow the possibility of including cases where one or more observations are missing, the option of longer intervals than one year will be accepted in the initial analyses. Therefore *year 1* is defined as the start year and *year 2* is defined as the end year of the observation interval irrespective of the length of the interval (e.g. year 1 is 1991 and year 2 is 1994).

Table 7.1 Definitions used for first order change categories

Concept/category	*Variable*	*Definition*
Variables		
Export quota year 1	$expq_1$	(value export sales year 1)/(value total sales year 1)
Export rate year 1 to year 2	$expr_{12}$	$expq_2 / expq_1$
Band width stable category	s	Random deviation from 'no change', cf. 6.3.5
Change categories		
1 Non exporter		$expq_1 = 0;\ expq_2 = 0$
2 Stop exporting		$expq_1 > 0; expq_2 = 0$
3 Decrease		$expr_{12} < 1 - s$
4 Stable		$1 - s \leq expr_{12} \leq 1 + s$
5 Increase		$expr_{12} > 1 + s$
6 Start exporting		$expq_1 = 0; expq_2 > 0$

In Table 7.2 the corresponding six categories of changes over pairs of observations are depicted with accepted deviations from mean values for the stable category being *s=0.1*, *s=0.2*, and *s=0.3*, respectively. These three 'bands' of the stable category define three sections of the table.

Table 7.2 illustrates the influence of choosing different widths of the tolerance band for the stable category, and also of using intervals of more than one year if missing observations should occur. The table depicts frequencies of all combinations of observation years. As can be seen, the percentages of non-exporters and enterprises starting or stopping exporting are identical in the three sections of the table. Between 35% and 50% of the enterprises were non-exporters in both of the years that constitute the pairs of the observed measure. The percentages of enterprises starting or stopping exporting are about the same: low and consistent.

Table 7.2 First order change model of export quota, two observations. Distribution of enterprises, percent.

	1991 -				*1992*			*1993 -*		*1994-*
	92	*93*	*94*	*95*	*93*	*94*	*95*	*94*	*95*	*95*
s=0.1										
Non-exporter	50	43	42	39	47	47	45	40	35	37
Stop	1	4	2	4	2	2	2	1	2	1
Decrease	16	15	14	13	15	11	10	16	15	17
Stable	15	15	18	18	16	17	17	18	21	22
Increase	18	20	21	23	18	21	23	22	23	22
Start	1	4	3	4	2	2	4	2	4	2
Sum	100	100	100	100	100	100	100	100	100	100
s=0.2										
Non-exporter	50	43	42	39	47	47	45	40	35	37
Stop	1	4	2	4	2	2	2	1	2	1
Decrease	10	10	9	8	9	8	6	12	9	12
Stable	24	24	28	28	25	25	26	28	32	32
Increase	14	15	16	18	14	17	18	16	17	18
Start	1	4	3	4	2	2	4	2	4	2
Sum	100	100	100	100	100	100	100	100	100	100
s=0.3										
Non-exporter	50	43	42	39	47	47	45	40	35	37
Stop	1	4	2	4	2	2	2	1	2	1
Decrease	8	7	6	5	7	5	4	9	7	9
Stable	28	31	34	34	31	31	31	34	37	37
Increase	12	12	12	15	11	14	15	13	15	15
Start	1	4	3	4	2	2	4	2	4	2
Sum	100	100	100	100	100	100	100	100	100	100
N	1251	973	840	782	1063	940	857	1024	1071	1020

When looking for the dynamic aspects, the first interesting trait is that distributions are fairly stable whether we look at one, two, three, or four year intervals; and also whether we use 1991, 1992, 1993, or 1994 as the initial

year. This is an indication that the procedure for calculation delimiting values for time intervals of more than one year is appropriate[25].

However, there are also other dynamic aspects in Table 7.2. The percentage of non-exporters varies between 50% (observations 1991 and 1992) and 35% (observations 1993 and 1994). Very interestingly, the percentage of enterprises that are non-exporters is dropping consistently over this period[26]. Another feature is that the percentage of enterprises classified as 'stable' increases consistently over time, independent of the selected band width of the stable category.

Among the enterprises included in this cohort, more enterprises tend to become exporters, and more enterprises tend to stabilise their export quota over the observation period.

Second order change model of export quota

When changes over three or more observations are registered for individual enterprises a dynamic picture appears. The operational definitions[27] of the six dynamic change categories are:

Table 7.3 Definitions of second order change categories.

	Category	*Definition*
1	Non-exporter	All periods no export sale
2	Incremental growth	All periods increasing or stable.
3	Stable	All periods stable.
4	Incremental decline	All periods decreasing or stable.
5	Irregular	All periods increasing or decreasing.
6	Intermittent	One or more occurrences of stop and/or start.

The frequency distributions depicting the second order change patterns are set out in Table 7.4. The main purpose of this presentation is to explore the effects of variations of three parameters: different delimitation of the stable

[25] Equal results for different intervals are consistent with the assumption that change rates in two consecutive periods are independent.

[26] The actual measures applied are the percentage of enterprises that are non-exporters in both of the two years that constitute an observation pair, i.e. 1991-92, 1991-93, etc.; and changes in export quota over the same periods.

[27] See Appendix 4 for the actual procedures and equations.

category through variation of *s*, the number of observations combined with variations in the number of cases available, and the very important effect of basing the interpretation on first or second order change models.

Delimitation of the stable category

Looking at Table 7.4 in isolation, it is obvious that the increased frequency of enterprises in the stable category, and the decreased frequency of enterprises in the irregular category when the width of the stable category is increased (increasing s), comply with what should be expected. So does the reduced frequency of incrementally declining enterprises. However, the frequency of incrementally growing enterprises displays a peak value for *s=0.2*.

Number of observations

When moving from minimum three observations, through minimum four, to five observations per enterprise, cases are excluded from the analyses. This means that all cases with five and four observations are included in the analyses with a minimum of three observations, and all cases with five observations are included in analyses with a minimum of four observations. There is a trade-off between information provided through a large number of cases and information provided through more extensive observations of each case.

When the minimum number of observations is increased, the frequency of enterprises in the irregular category increases for all values of s. At the same time the frequency of enterprises in the stable category is decreased. The implication of this is that there is a proportionally lower number of 'missing values' in the irregular category than in the others in the columns for 'minimum 3' and 'minimum 4 observations'.

Table 7.4 Second order change model of export quota. Influence of number of observations and delimitation of stable category.

	Minimum 3 observations		*Minimum 4 observations*		*5 observations*	
	N	*%*	*N*	*%*	*N*	*%*
s=0.1						
Non-exporter	667	41	319	44	111	44
Incremental growth	241	15	86	12	24	9
Stable	107	7	38	5	10	4
Incremental decline	143	9	39	5	8	3
Irregular	406	25	212	29	87	34
Intermittent	40	3	40	5	14	6
Total	1604	100	734	100	254	100
s=0.2						
Non-exporter	667	41	319	44	111	44
Incremental growth	269	17	116	16	38	15
Stable	214	13	79	11	21	8
Incremental decline	127	8	36	5	10	4
Irregular	287	18	144	19	60	23
Intermittent	40	3	40	5	14	6
Total	1604	100	734	100	254	100
s=0.3						
Non-exporter	667	41	319	44	111	44
Incremental growth	244	15	104	14	35	14
Stable	315	20	127	17	35	14
Incremental decline	109	7	37	5	16	6
Irregular	229	14	107	15	43	16
Intermittent	40	3	40	5	14	6
Total	1604	100	734	100	254	100

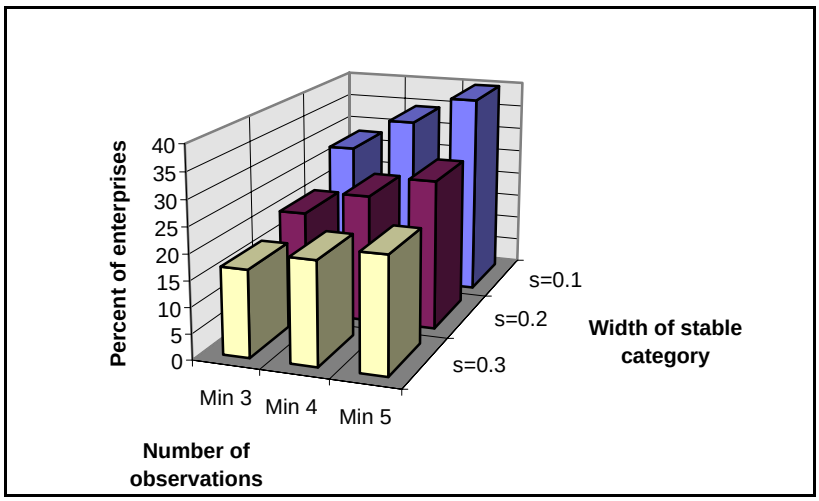
First versus second order change model

The most striking feature of Table 7.4 becomes apparent when compared with Table 7.2. Although the first order changes are used as a basis for the

second order change patterns, and the same delimitation (same values for *s*) is used to define the stable category, there are dramatic reductions of the frequencies in the stable category from the first order to the second order model. The reductions are influenced by the width of the tolerance band of variations for the stable category, and the number of observations required to assess the dynamic changes. However, between 50% and 60% of the enterprises that appears to follow a stable change pattern when using only two observations are really not stable when basing the analysis on three, four or five observations. The implication of this is that an enterprise, which appears to be stable over two observations no longer needs to be stable when more observations are included.

The three change-categories *incremental growth*, *stable* and *incremental decline* are consistent with the incremental growth models: The direction of change is the same throughout the entire five-year period. Similarly, the dynamic properties of the two categories *irregular* and *intermittent* may be termed 'non-incremental[28].

Figure 7.1 Enterprises with non-incremental growth patterns of export quota



[28] The first derivative of a mathematical representation of the change pattern would be consistently positive, zero or negative for the incremental growth category. It would vary between positive and negative or be indefinite for the non-incremental growth category.

By combining the categories of Table 7.4, an interesting picture emerges: Between one fourth and one third of the enterprises follow *non-monotonous* change patterns in their development of export quota, see Figure 7.1.

The development patterns of these enterprises do not comply with any model of the development process based on a gradual development paradigm.

7.1.2 Changes in total export sale

First order change model of export sales

The change in export quota depends on the development of total sales as well as development of export sales. The change in export sales alone should therefore exhibit smaller yearly variations than the sales in export quota. Maintaining the same upper and lower limiting factors for the stable areas as for export quota, we should expect to find a larger percentage of the enterprises in the stable category. This is confirmed by Table A4.6 in Appendix 4.

We note that there is no stable pattern of frequencies of enterprises in the decrease and the increase categories in Table A4.6. For some of the observation intervals decreasing enterprises are most frequently found, while in other observation intervals increasing enterprises are most frequent. This holds true whether we look at one-year intervals or longer. This is distinctly different from the patterns of changes in export quota, Table 7.4.

Another important difference between the two tables is that there is much more variation in the number of enterprises in the stable category in the different observation intervals. One possible explanation could be that we see here the effects of economic fluctuations with a parallel influence on domestic and foreign markets. The data set does not include information to explore this issue further.

Second order change models of export sales

As for export quota, the second order change patterns are also computed for export sales based on three observations or more observations. If we focus the discussion on the same elements as for export quota, some interesting similarities and differences become apparent, see Table A4.8 in Appendix 4.

Delimitation of the stable category

The width of the stable category has the same influence on the frequency of enterprises found in the various change categories. There is a distinct reduc-

tion in the stable category and a corresponding increase in the incremental growth and irregular categories when the width of the stable band is increased. There is also a peak in the frequency of incrementally declining enterprises for s=0.2.

Number of observations

By increasing the number of observations per enterprise and consequently reducing the number of cases in each category, the frequency of the irregular enterprises increases.

Changes in export quota versus changes in total export sales

The frequency tables for first and second order change patterns for the absolute measure of export sales patterns are given in Appendix 4, Tables A4.7 and A4.8.

There is one major and important difference between the corresponding Tables 7.2 and A4.7, depicting first order changes. The absolute as well as the relative share of enterprises in the stable category is significantly smaller for the absolute measure of export sales than for the relative measure of export quota. This suggests that there are co-linear variations in total sales and export sales.

The second order change patterns in Table A4.8 exhibit the same high frequency of enterprises with the irregular and intermittent change patterns. However, there is one important difference.

The properties of these two measures are quite similar as representations of dynamic behaviour and are quite similar also in other respects. On moving from low to high band width of the stable category (s=0.1 to s=0.3) the frequency of enterprises in the stable category increases as expected and enterprises in the non-incremental categories (irregular and intermittent) decrease. There is also decrease in the incremental categories and increase in the non-incremental categories on moving from minimum three to five observations for both measures.

7.1.3 Conclusion on change patterns

There are large differences in the way change patterns emerge when they are studied on the basis of two or several observations. The qualitative difference occurs on going from two to three or more observations. The difference is so pronounced that we may speak of two different change patterns:

The *first order change model* is the change pattern found when using two observations, the lowest number of observations that can be used to identify changes. The *second order change model* is the change pattern that emerges when we analyse the temporal development of the first order change model, which necessitates more than two observations.

Panel data are required to identify and analyse first as well as second order change models.

The width of the tolerance band of random fluctuations has a strong influence on the first order change models, but only a marginal influence on the second order change models.

The two different measures *export quota* and *export sales* give different, but nevertheless similarly structured, pictures of development patterns. The important fact is that both measures have a high proportion of stable enterprises judged by first order change models, and low a proportion of stable enterprises and a high proportion of irregular change patterns judged by second order change models.

The fluctuations within the tolerance band of the first order change model have the character of random variations around a mean value. There is no way of assessing the true value of the width of this tolerance band. The width has less influence on the distribution of enterprises within second order change models than within first order change models.

For the purpose of the thesis the following selections will be made:

Measure:	Export quota
Observations:	Minimum four
Tolerance width:	s=0.2

7.1.4 Dynamic patterns of entrepreneur characteristics

Table 7.5 illustrates the difference between circumstantial and permanent factor constellations for the measures of entrepreneur characteristics. The 16 variables[29] constitute the total set of variables measuring different aspects of the capabilities and attitudes of the manager. Identical procedures for extracting the factors and criteria for including a variable in the factor interpretation are used for each year[30]. Never the less, the number of extracted fac-

[29] See Appendix 3, Table A3.1 for definition.

[30] SPSS for Windows 6.1.3 Factor analysis. Varimax (orthogonal) rotation. Number of factors: minimum Eigenvalue = 1. Inclusion of variables for interpretation: factor loading ≥ 0.3,

tors varies between five and six, and the variables loading significantly on each factor differ over the years.

Table 7.5 Entrepreneur characteristics. Initial factor analysis.

Var.	*1991*						*1992*					*1993*					*1994*					*1995*				
code	*f1*	*f2*	*f3*	*f4*	*f5*	*f6*	*f1*	*f2*	*f3*	*f4*	*f5*	*f1*	*f2*	*f3*	*f4*	*f5*	*f1*	*f2*	*f3*	*f4*	*f5*	*f1*	*f2*	*f3*	*f4*	*f5*
V901			✓									✓					✓					✓				
V902	✓						✓					✓					✓					✓				
V903			✓								✓			✓			✓					✓				
V904			✓				✓				✓	✓		✓			✓					✓				
V905					✓					✓					✓						✓					✓
V906					✓					✓					✓						✓					✓
V907	✓						✓					✓	✓					✓				✓		✓		
V908	✓						✓					✓	✓					✓					✓	✓		
V909		✓						✓					✓						✓				✓			
V910		✓						✓					✓						✓				✓			
V911		✓						✓					✓					✓	✓				✓			
V912	✓						✓					✓					✓	✓				✓		✓		
V913	✓			✓					✓							✓		✓							✓	
V914				✓			✓		✓							✓				*				✓	✓	
V915			✓	✓					✓			✓				✓				*					✓	
V916						✓					✓			✓						*				✓		

Criterion: Eigenvalue ≥ 1.0; factor loading ≥ 0.3

The chosen solution to this problem has been to identify which variables exhibit stable patterns of relationships over the years. This has been used as the criterion for the selection of dynamically stable factors. The procedures will be described in detail for the factors related to the concepts: characteristics of the entrepreneur and the enterprise. For factors related to other concepts of the total model, only summary results will be presented in the main body of the text.

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which is considered significant for sample size 350 and greater (Hair *et. al.*, 1995:377 & 386).

If the factors identified in Table 7.5 were used to analyse how relationships develop over time, interpretations would be impossible. There are two main reasons for this: First of all there are different number of factors each year. This problem can be overcome by using the 'number of factors criterion' instead of 'Eigenvalue criterion'.

More critical for the interpretation is the fact that the composition of factors is quite different in the different yearly observations, see Table 7.6. Factor *f1*, which explains most of the variance, has significant loading from following variables:

Table 7.6 Variables loading significantly on factor f1 in Table 7.5

Interval	*Significantly loading variables*								
	V901	*V902*	*V903*	*V904*	*V907*	*V908*	*V912*	*V913*	*V914*
1991		✓			✓	✓	✓	✓	
1992	✓			✓	✓	✓	✓		✓
1993	✓	✓			✓	✓	✓		
1994	✓	✓	✓	✓			✓		
1995	✓	✓	✓	✓	✓		✓		

Returning to Table 7.5 we find another manifestation of the transient nature of the factor loadings. The variables V905 and V906 load significantly on the same factor in all observations, and furthermore, no other variable loads significantly on these factors. The variables V907 and V908 also always appear in combination when they load significantly on the factors, but in conjunction with different variables each year. We here see two different dynamic patterns of relationships between the variables: Variables V905 and V906 represent a stable pattern, while variables V907 and V908 represent an unstable pattern.

In order to identify factors that are stable over the entire period of observation, the initial set of 16 variables has been split into sub-sets. The criteria for including variables in the sub-sets have been to hold together combinations of variables which appear in stable combinations in all intervals; and to keep apart variables which appear in unstable combinations.

Table 7.7 Summary of stable factors of entrepreneurial characteristics.

	1991				*1992*				*1993*				*1994*				*1995*			
	f1	*f2*	*f3*	*f4*	*f1*	*f2*	*f3*	*f4*	*f1*	*f2*	*f3*	*f4*	*f1*	*f2*	*f3*	*f4*	*f1*	*f2*	*f3*	*f4*
Variable sub set 1																				
V902		✓				✓				✓				✓				✓		
V903		✓				✓				✓				✓				✓		
V904		✓				✓				✓				✓				✓		
V909	✓				✓				✓				✓				✓			
V910	✓				✓				✓				✓				✓			
V911	✓				✓				✓				✓				✓			
Variable sub set 2																				
V905			✓				✓				✓				✓					✓
V906			✓				✓				✓				✓					✓
V907		✓				✓				✓				✓				✓		
V908		✓				✓				✓				✓				✓		
Variable sub set 3																				
V901																				
V912																				
V913	Factor patterns ambiguous and not stable over time																			
V914																				
V915																				
V916																				

Criterion: *Eigenvalue* ≥ 1.0*; factor loading* ≥ 0.4[31]

At this stage of the analyses only statistical methods have been used. Interpretation of the variables will follow and be taken into account before applying the factor solutions in further analyses. It is important to emphasise that the sole purpose of the factor analysis is to ascertain where stable relationships can be found. Further analyses are required before any inference on

[31] Hair *et al*. (1995:386) advice to increase factor loading used for interpretation of factors when the number of factors decreases, cf. footnote 5.

causality can be made. The included variables may or may not correlate with the other variables or factors in subsequent causal analyses.

Through repeated factor analyses with gradual reduction of the variables included, four stable patterns of variables, defining four corresponding factors of entrepreneur characteristics have been identified in two subsets of variables, see Table 7.7. Six of the variables cannot be included in stable factor patterns over the entire period of observation and will be included as individual variables in the further analyses.

7.1.5 Interpretation of factors

The combination of variables in a factor provides an opportunity for interpretation of the underlying concept which is measured by the variables.

Factor f1 - *Planning preference*

This factor includes three variables which all are value statements, measured on a five point ordinal scale (O) ranging from 1 - strongly disagree to 5 - strongly agree. The variables are:

		Scale
V909	Jobs should be clearly defined and defined in detail.	O
V910	Managers should plan instead of follow their intuition.	O
V911	Firms should only introduce proven office procedures and production techniques.	O

These variables all reflect attitudes on issues related to preference for planning and predictable development. A high, positive value reflects priority for planning and predictable development.

Factor f2 - *Capability of manager*

This factor includes three descriptive variables with ratio scales (R):

		Scale
V902	How many years of experience do you have in your industry?	R
V903	How many weeks altogether did you stay abroad over the past 3 years?	R
V904	In how many languages (including your mother tongue) can you and your senior managers carry out business?	R

These variables all reflect the capabilities and experience of the manager and the management generally, but also the language potential for operating abroad. A high, positive value indicates high capability.

Factor f3 - *Preference for stability*

This factor includes two attitudinal statements with the same ordinal scale as above:

		Scale
V907	Changes in enterprises should be avoided at all costs.	O
V908	A firm should not leave the region where it is established.	O

These variables both express attitude on the desirability of avoiding changes. A high, positive value indicates preference for stability.

Factor f4 - *Objection to external intervention*

This factor includes two attitudinal statements with the same ratio scales as above:

		Scale
V905	The government should not restrict competition, even through the use of incentives.	O
V906	Professional bodies and similar organisations should provide assistance only to their members.	O

These variables address issues related to intervention by external parties in the operation or performance potential of the enterprise. High values indicate preference for no intervention.

Variables without stable factor relationships

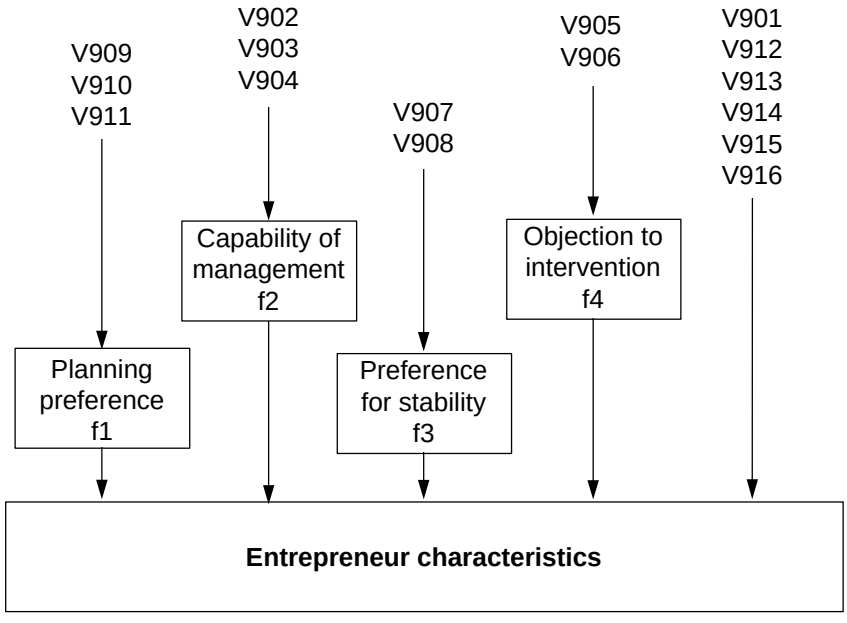
One descriptive variable and five of the attitudinal variables are not included in the factor patterns that are stable over time. This does not reflect the significance of these variables, merely that these variables exhibit temporal fluctuations which are different from the other variables:

		Scale
V901	At what age did you leave full time education (including apprenticeship, university, etc.)?	R
V912	In family-owned businesses the management should stay in the hands of the family.	O
V913	Small firms should not hesitate to do business with large firms.	O
V914	Small business managers should take personal responsibility for the recruitment of all employees.	O
V915	A manager should consider ethical principles in his behaviour.	O
V916	Business should take precedence over family life.	O

A high value of any of the variables V912 - V916 indicates agreement with the statement.

The structure of the ensuing empirical measurement model for entrepreneur characteristics is depicted in Figure 7.2.

Figure 7.2 **Summary of stable factors of entrepreneur characteristics**



ch07_f01.ppt

Discussion

A comparison of Figures 7.2 and 6.1 illustrates that imposing requirement for temporal stability has a strong influence on the structure of the factors of entrepreneur characteristics. Education and experience have been combined into one factor in Figure 7.2. Three different attitude factors have been identified while half of the attitude variables and one descriptive variable do not appear in any temporal stable combinations with other variables.

7.1.6 Enterprise characteristics

Only one of the dimensions included in the measurement of enterprise characteristics is measured by multiple variables, see Figure 6.2. The specialisation of the enterprise is measured by an index, see below. All other variables will be included directly at the appropriate stages of the causal analyses, see Chapter 8.

Specialisation index

Twelve variables are used to measure the three facets of specialisation: manufacturing mode, product range, and market focus. Eight of these variables are dichotomous variables, while 4 are ratio scale variables, see Appendix 5.

The specialisation index (SPC) may assume values between 1 (one) and 0 (zero) A high value (close to 1) will indicate a highly specialised enterprise; a low value (close to 0) will indicate that the enterprise has a very low degree of specialisation. The extreme values of *totally* or *no* specialisation has only theoretical meaning.

Specialisation of a manufacturing enterprise is seen as having three dimensions:

1. *Manufacturing specialisation (MFG)* relates to specialisation of the production system. A highly specialised system will be specially adapted to one or closely related products or product groups. Low manufacturing specialisation will mean that the productions system may be used for a wide range of products or product groups. The competitive advantage of a manufacturing system with high specialisation will be volume or scale of production. The competitive advantage of a manufacturing system with low specialisation will be flexibility or versatility.

2. *Product specialisation (PRD)* relates to specialisation of the products. Any consumer product, identifiable by being sold from stock, will be regarded as being less specialised than a product that is made to order. An-

other dimension of product specialisation relates to the number of products and the degree to which the enterprise concentrates on few of the products. The competitive advantage of an enterprise with high product specialisation is that substitutability for the products is low. The competitive advantage of low product specialisation is the potential of supplying a wide range of products, thus obstructing the access to the market for competitors.

3. *Market specialisation (MARK)* relates firstly to the customer requirements as being differentiated or similar; secondly to the number of customers and the degree of concentration on a few groups of customers. The competitive advantage of high market specialisation lies in the ability to comply with special customer demands. The competitive advantage of low market specialisation lies in less dependence on developments of existing customers.

There is potentially, but not necessarily, high correlation between these three dimensions of specialisation. The enterprise is therefore free to combine specialisation along these three dimensions, although some combinations may have higher *a priori* probability than others. Since the three elements are not complementary, but have reciprocally modifying effects, their combined effect will be of a multiplicative, not an additive, nature. To allow calculation of the specialisation index, also if observations of one or two dimensions are missing, the format of the specialisation index is:

$$SPC_i = \sqrt[n]{MFG_i \cdot PRD_i \cdot MRK_i} \qquad [7.1]$$

where *i* identifies the year and *n* is the number of valid dimensions, observation exists, see Appendix 5.

The specialisation index defines a scale from approximately 0 (zero) to one (1).

Although appearing to be a continuous ratio scale, this is strictly an *ordinal scale*. The definitions, the computational procedures and the ensuing scale provide a consistent system for ranking enterprises as to their degree of specialisation. Through the procedures defined above, each enterprise is assigned one unique position along the scale. This system cannot, however, be used to measure the difference or ratio of specialisation between two enterprises. Neither can it be used to assess the exact change in specialisation of one enterprise between observations in two points of time.

For further statistical analyses and tests, the specialisation index may be assumed to be normally distributed with a mean value close to 0.5 and standard deviation in the area 0.18 to 0.20 for each of the five years, see Table A5.2

7.1.7 Combined structural measurement model

The requirement for temporal stability has produced a structure of factors of entrepreneur characteristics, Figure 7.2, which is different from what was anticipated, Figure 6.1. It is therefore important to investigate the dynamic properties of the combined measurement model for entrepreneur and enterprise characteristics. This part is based on structural equation modelling, using the LISREL program (Bollen, 1989; Hair *et al.*, 1995; Jöreskog and Sörbom, 1995).

The concepts 'enterprise characteristics' and 'entrepreneur characteristics' are presumed to be closely related and therefore analysed simultaneously in the structural measurement model, see sections 4.2 and 6.1. The total list of measures (variables) of these concepts are delineated by the discussions in Sections 4.2 and 6.2.1, and summarised by Figures 4.4, 4.5, 6.1, 6.2, and 6.3. Required modifications and data reduction based on actual data are presented separately for the two concepts 'entrepreneur characteristics' and 'enterprise characteristics' in Sections 7.2.2. and 7.2.3.; which leads to the following list of factors and corresponding potential measures presented in Appendix 5 Table A5.3.

7.2 Export stimuli

7.2.1 Factor analysis

A total of nine factors measuring latent or underlying concepts can be identified among the indicators of stimuli for exporting or internationalisation, see Table 7.8 and Appendix 5. This is quite different from the *a priori* assumption of the theoretical measurement model, which anticipated discrimination between two factors: internal and external stimuli, see Figure 6.3. Initial attempts provided no support for this approach to modelling. The analysis converged on factors that were stable over all observations only after splitting the data set into three groups[32]. These groups reflect internal as well as

[32] The procedures followed for arriving at the temporally stable factors are the same as described for entrepreneur characteristics, see Section 7.2.1.

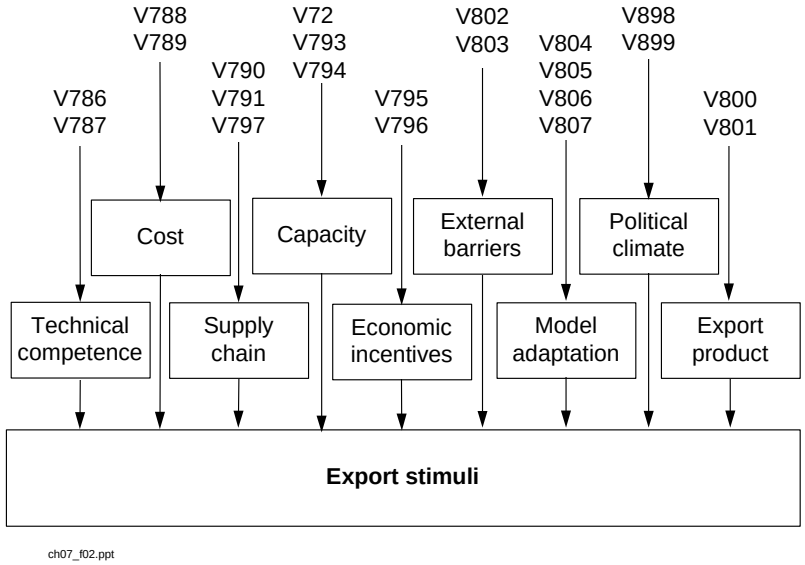
external measures. One interesting feature is that there are few and very similar variables in most of the factors. The similarities between the measures are so strong that there is hardly any multi-dimensionality in the factors. Table 7.8 and Figure 7.2 outline the factors of export stimulation. The total factor analysis is presented in Appendix 5.

Table 7.8 Temporally stable factors of export stimulation

Chart code	*Description*	*Included variables*	
Variables sub group 1			
tech	Technical competence	v786 v787	i
cost	Cost	v788, v789	i/e
supl	Supply chain	v790, v791, v797	e
cpac	Capacity	v792, v793, v794	i/e
Variables sub group 2			
econ	Economic incentives	v795, v796	e
barr	External barriers	v802, v803	e
copy	Model adaptation	v804, v805, v806, v807	i/e
Variables sub group 3			
poli	Political climate	v798, v799	e
prod	Export product	v800, v801	i

Legend: e = assumed external variables; i = assumed internal variables

Figure 7.3 Stable factors of export stimuli



7.2.2 Correlation between factors

One problem encountered when trying to establish a LISREL model for enterprise characteristics, see A5.1.2, was caused by low correlation between the factors. Therefore the correlation between the stimuli factors is calculated in Appendix 5. As can be seen from Table A5.6. the correlation is generally low. The interpretation of this is that the importance attached to factors individually and combinations of factors is unique to each enterprise. The enterprises have individual approaches to their response to stimuli.

7.3 External interaction

An index has been developed for external interaction along the same lines and reasoning as for specialisation. Extensive external interaction means that the enterprise has a high number of information channels, related to several fields of activity, directed abroad, and with few sources of interference between itself and its customers. The actual procedures for establishing the

external interaction index (EXIN) are developed in Appendix 5, Section A5.3.

External interaction is seen as having four dimensions:

1. *Co-operation* is an ordinal measure ($COOP_i$) with the lowest assigned value for co-operation with a domestic partner domestically and the highest value for co-operation with a foreign partner abroad.
2. *Information exchange* ($ITOP_i$) is a ratio scale measure indicating the proportion of its areas of business activities where the enterprise has an exchange of information with external partners.
3. *International exchange* ($IEXCH_i$) is a dichotomous variable with the value 0.5 for information exchange with domestic partners only, and the value 1 if any of the information exchange is with a foreign partner.
4. *Distribution channel* ($CHAN_i$) is an ordinal measure of the information conductivity of the distribution channel. The variable is assigned a higher value for more direct contact with the actual customer (few intermediaries in the distribution chain).
5. *Customer location* (CLOCi) is another dichotomous variable with the value 0.5 if all customers are domestic, and the value 1 if the enterprise has exported during the year.

These five dimensions of external interaction cannot be assumed to be independent of each other. On the contrary, there are strong reasons to expect interaction with reciprocally modifying effects. Their combined effect will therefore be of a multiplicative, not additive, nature.

All of these variables are calibrated to a scale in the interval 0 to 1, and missing values (observations) are compensated for in the same way as for the specialisation index. The consequence of the compensation is that missing values for some of the variables reduce the dimensionality of EXIN, but allow further analyses with a less precise measure.

The external interaction index will be computed by following equation, cf. A5.3.4:

$$EXIN_i = \sqrt[N_i]{COOP_i \cdot IEXCH_i \cdot ITOP_i \cdot CHAN_i \cdot CLOC_i} \qquad [7.2]$$

N_i = number of factors with valid observations; $1 \leq N_i \leq 5$

i = indicator of observation year.

$0 < EXIN_i \leq 1$

The external interaction index defines a scale from approximately 0 (zero) to 1 (one).

Although appearing to be a continuous ratio scale, this is strictly an *ordinal scale*. The definitions, the computational procedures and the ensuing scale provide a consistent system for ranking enterprises as to their degree of external interaction. Through the procedures defined above, each enterprise is assigned one unique position along the scale. This system cannot, however, be used to measure the difference or ratio of external interaction between two enterprises. Neither can it be used to assess the exact change in external interaction of one enterprise between observations at two points of time.

For further statistical analyses and tests, the specialisation index may be assumed to be normally distributed with a mean value close to 0.5 and a standard deviation in the area 0.18 to 0.20 for each of the five years, see Table A5.12

7.4 Final measurement model

The final measurement model has the identical structure as described by Figures 4.4, 4.5 and 4.6. However, the measures of the concepts of the causal model have been transformed and reduced through the procedures described in this chapter. In this process the only consideration so far has been the patterns of correlation between the exogenous variables, resulting in reducing the set of variables to 22 factors and variables. The final step of the data reduction process is to exclude variables with very small or negligible influence on final results by means of the correlation coefficients between these 22 variables and the endogenous variables, change in export quota and change in market expansion, see Table A6.9 of Appendix 6.

Two criteria are applied to include variables in the further analyses:

1) correlation coefficients must be 0.1 or higher for more than one observation[33]
2) variables of special theoretical interest are included even if criterion 1) is not met.

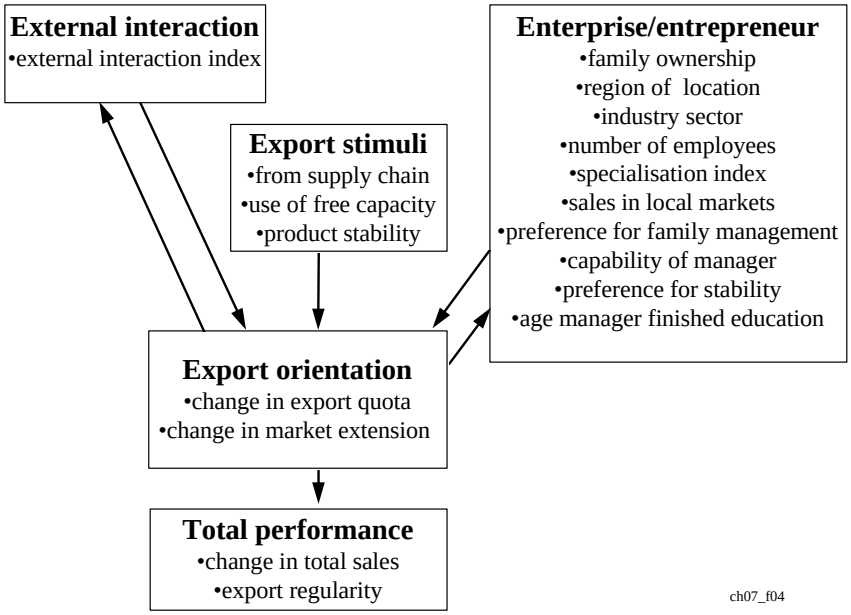
Bold lettering in Table A6.9 indicates the correlation coefficients complying with these requirements and the corresponding variables to be included in the further process.

[33] Using correlation coefficient ≥ 0.1 as the cut-off value is a conservative criterion. This implies that more variables than probably necessary are included in the further analyses.

Additionally, the further analyses will include those descriptive variables which, in accordance with previous theoretical deliberation, will be given special attention: enterprise size (number of employees), industry sector, location (region), and ownership (family control).

The outcome of this data reduction process is summarised in Figure 7.4.

Figure 7.4 Concepts, measures and relationships of causal model



7.5 Concluding remarks

Although no analysis of causality has been performed yet, a few important concluding remarks can be made even at this stage.

It is important to recognise that the purpose of the statistical analyses is to ascertain co-variation between the included concepts, not to make a prognostic model. The requirements for the format of the various measures are therefore less stringent than for a prognosis model. The practical consequence can be illustrated using the external interaction index as an example.

Instead of using a multiplicative structure for the indices of specialisation and external interaction, these multi-dimensional indices could be generated

using the structure of Euclidean distance[34] (Hair *et al.* 1992:271). This could also be calibrated to an arbitrary scale and compensation for missing values could be included. However, both the selected format and Euclidean distance share the property of uniformly increasing the total value with increasing the value of each of the included dimensions. This is the essential property for the intended analysis of co-variation.

The measuring model which was based on theoretical deliberations and previous research, see Chapter 6, is different from the empirical measuring model. The manifestation of the differences is mainly to be found in the actual measures that interact and the lack of stability in interaction between measures. There are two main elements contributing to this difference.

First of all, the main contributions to the theoretical measurement model have come from previous cross-sectional studies. The differences between factor analyses based on single year and multiple year observations, see Section 7.2.1, illustrate this point. Observations at one point in time obscure the fact that some of the observed correlation is circumstantial.

Secondly, very low correlation coefficients were generally found when a large number of indicators were used to measure theory-based concepts. The structure of correlation coefficients also tended to change over time. One practical consequence of this was that factors tended to be very simple, consisting of variables which clearly 'should' be highly correlated. The implication of this is that an enterprise has an individualistic approach to what is important for its development. Furthermore, the combination of factors that are important for each enterprise changes over time - it is circumstantial.

[34] $y = \sqrt{\frac{x_1^2 + x_2^2 + \cdots + x_n^2}{n}}$, n = number of observed dimensions

8 CAUSAL ANALYSIS

8.1 Categories of enterprises and export orientation

The basis for the causal analysis was developed in Chapter 4 and outlined in Figures 4.4, 4.5, and 4.6. The data reduction described in Chapter 7 has provided a reduced set of metric variables all on ratio scales. Three categorical variables: *geographic region, industry sector,* and *family ownership* have not been included in these data reductions. The reason has been to allow explicit analysis of the effects of these variables.

The interaction of the three categorical variables with the two measures of change in export orientation, *change in export quota* and *change in market extension,* has been studied by the analysis of variance, see Tables A6.2 through Table A6.8. in Appendix 6.

8.1.1 Change in export quota

No statistically significant[35] interaction has been found between the categories of enterprises, defined by the exogenous variables (region, industry sector and family ownership) and the endogenous variable change in export quota. This holds for the exogenous variables individually, see Table A6.2, as well as for pairs of the exogenous variables, see Tables A6.3, A6.5 and A6.7.

Tables A6.3, A6.5 and A6.7 in Appendix 6 reveal apparent differences in mean values of change in export quota accountable to pairwise interaction of the three exogenous variables. The lack of statistical significance is the result of high standard deviations. A closer scrutiny of the same tables also reveals that the range order of 'high' and 'low' mean values of change in export quotas varies over the four intervals of observation. Since this variation is additional to the lack of statistical significance, the pattern of interaction between these three exogenous variables and change in export quota is not stable over time.

8.1.2 Change in market extension

Each of the exogenous variables has individually statistically significant influence on change in market extension for each of the intervals, see Table

[35] 95 percent confidence level, see Appendix 6

A6.2. The interaction of the variables *region* and *industry sector* also has statistically significant influence on *change in market extension* for each of the intervals, see Table A6.6. Additionally the interaction of the variables *family ownership* and *region* has a significant effect on the level of change in market extension for the interval 1994/95, but not for the other intervals, see Table A6.4. The latter observation is therefore not part of a stable pattern, but underlines the temporal variations of these relationships.

Table A6.4 shows that:

1. ***Region*** *Centre* has consistently the lowest index for market extension; while *BeNe* and *Nord* in two intervals each have the highest and median values for the index.
2. ***Family ownership*** has consistent influence since *family enterprises* in all intervals have a lower index of market extension than non-family owned enterprises

Table A6.5 shows that:

3. ***Industry sector*** *electro* has consistently the highest index for market extension, followed by *wood & furniture*, and *mechanical*; while *textile* and *food & beverages* alternate between holding the two lowest values of the index.

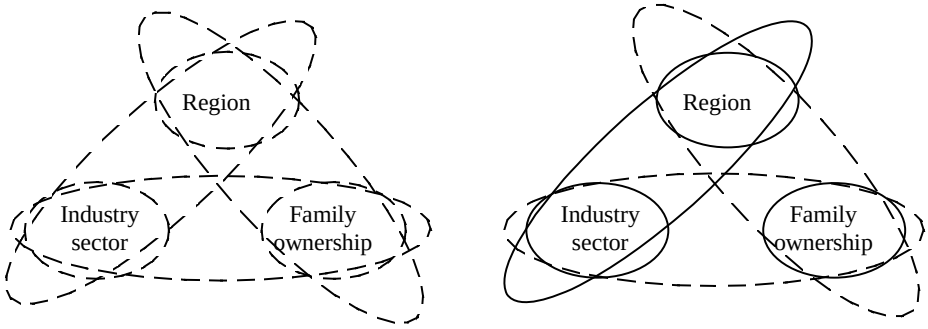
Table A6.6 shows that:

4. ***Industry sectors and region*** interaction manifestations are found both ways. There are regional differences as to which industry sector has the highest and lowest change index of market extension. *Mechanical industry sector* has the highest market extension change rates for the region *Nord*, *textile industry sector* for the region *BeNe* and *electro industry sector* for the region *Centr* (three out of four intervals). There are also industry sector differences as to which region displays highest and lowest change rates. All industry sectors have consistently the lowest change indices for *Centr* region, while there are variations for *BeNe* and *Nord*.

The statistical significance[36] of stable interactions of the categorical exogenous variables: region, industry sector and family ownership; and the endogenous variables: change in export quota and change in market extension; are summed up in Figure 8.1.

[36] The discriminatory power of the statistical significance criterion is very pronounced since the significant interactions are all at a level $p < 0.01$. Similarly, where relationships are found to be not significant, the test level in each case has been $p < 0.1$

Figure 8.1 Interaction between exogenous and endogenous variables



(a) change in export quota

(b) change in market extension

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8.1.3 Consequence for further analyses

Although the above analyses could not identify any interaction between the categorical variables and changes in export quotas as to mean values for the categories, there is still a possible interaction between the two measures of export orientation and the three categorical, exogenous variables on enterprise level.

All variables will be included in the subsequent analyses, but interpretations will keep above the observations in mind. The number of observed enterprises, especially in BeNe region, is, however, too small to allow any further analysis of the interaction of industry sector and region in the present model framework.

8.2 Reduced set of variables and export orientation

The analysis of relationships between exogenous and endogenous variables will be performed by means of the path analysis sub-model of the LISREL program (Jöreskog and Sörbom, 1993). The advantage of using this program

is that, in addition to the simultaneous approach of the procedures, the researcher has a high degree of control over the steps of the analysis and also the relationships to be included in the model[37].

The purpose of this part of the analysis is to establish the patterns of causal relationships where all remaining variables measured on ratio scales are included. Input to the LISREL model are correlation coefficient matrices and number of observations, see Table A6.10, Appendix 6. Table 8.1 gives the results of the LISREL path analysis with change in market extension (mexten) and change in export quotas (expgr) as endogenous variables.

[37] An attempt at using the SPSS procedure for multivariate analysis of variance (Manova) was not successful. This procedure uses listwise deletion of cases when encountering missing values of variables. Due to the high number of variables only 43 valid cases remained, resulting in low reliability of results.

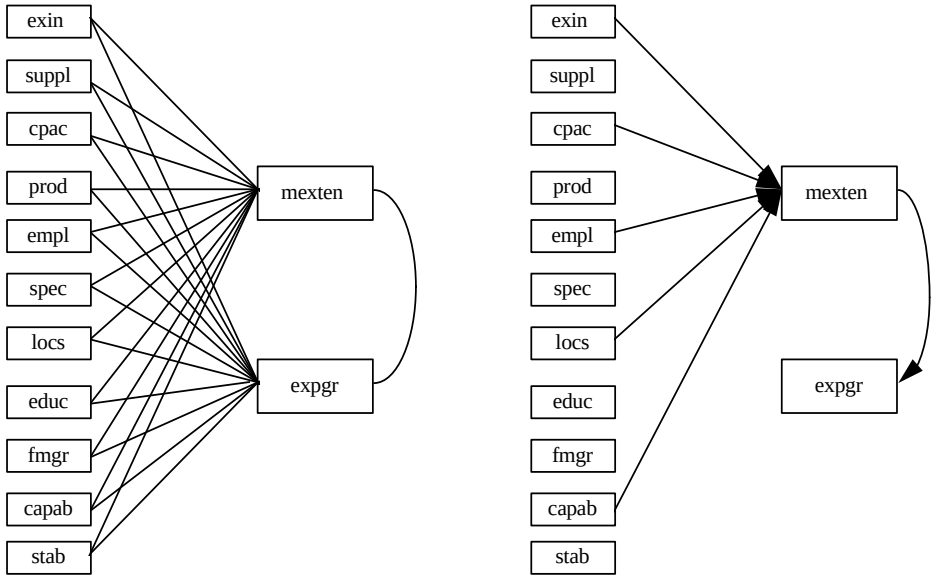
Table 8.1 Regression between exogenous variables and export orientation measures.

		1991/92		*1992/93*		*1993/94*		*1994/95*	
		mexten	*expgr*	*mexten*	*expgr*	*mexten*	*expgr*	*mexten*	*expgr*
exin	γ	**0.22**	-0.12	**0.22**	0.00	0.10	-0.15	0.12	-0.07
	t	**2.87**	-1.30	**2.78**	0.00	1.37	-1.75	1.45	-0.69
supl	γ	-0.04	0.03	-0.03	-0.03	-0.05	0.05	-0.10	-0.05
	t	-0.58	0.19	-0.41	-0.34	-0.83	0.64	-1.58	-0.70
cpac	γ	-0.07	-0.03	-0.04	0.02	0.02	-0.01	0.05	-0.03
	t	-1.10	-0.34	-0.61	0.23	0.35	-0.08	-0.76	-0.42
prod	γ	-0.04	-0.03	-0.04	0.10	0.12	0.05	-0.08	-0.11
	t	-0.64	-0.39	-0.57	1.19	-1.75	0.61	-1.20	-1.31
empl	γ	**0.14**	-0.02	0.03	-0.05	0.07	0.05	**0.15**	-0.02
	t	**2.30**	-0.23	0.43	-0.62	1.04	0.66	**2.21**	-0.22
spec	γ	-0.06	-0.04	-0.08	0.14	-0.02	0.04	-0.02	0.05
	t	-0.97	-0.54	-1.23	1.81	-0.32	0.51	-0.23	0.67
locs	γ	**-0.22**	-0.06	**-0.26**	**-0.26**	**-0.25**	-0.10	**-0.20**	-0.01
	t	**-3.14**	-0.68	**-3.54**	**-3.54**	**-3.44**	-1.11	**-2.58**	-0.09
educ	γ	0.03	-0.06	-0.02	-0.02	0.00	-0.02	-0.20	-0.04
	t	0.49	-0.80	-0.24	-0.24	0.07	-0.30	-0.24	-0.49
fmgr	γ	-0.08	-0.03	-0.05	-0.05	-0.01	0.06	-0.01	-0.09
	t	-1.19	-0.30	-0.77	-0.77	-0.21	0.74	-0.13	-1.06
capab	γ	0.09	0.07	0.11	0.11	**0.20**	-0.04	**0.16**	0.01
	t	1.30	0.88	1.63	1.63	**2.88**	-0.47	**2.05**	0.14
stab	γ	-0.07	0.04	-0.03	-0.03	-0.06	0.00	-0.01	0.08
	t	-0.95	0.45	-0.39	-0.39	-0.92	-0.04	-0.20	1.00
mexten	γ		0.07		0.06		0.06		
	t		0.75		0.73		0.73		
expan	γ							-0.02	
	t							-0.21	
Expl. var.		0.31	0.04	0.25	0.04	0.25	0.04	0.29	0.03
N		194		194		194		194	
Model fit		Not relevant -- saturated model							

In Table 8.1 the regression coefficients are indicated by γ, while t-values specify significance[38]. In the final data set, the two endogenous variables plus exogenous variables with $t \geq 1.96$ in one or more of the years, are included.

The initial model for the path analysis is illustrated in Figure 8.2(a) while Figure 8.2(b), based on Table 8.1, sums up the total assessment of separate analyses for all intervals.

Figure 8.2 Illustration of path analysis, significant relationships. Intermediate model. Assessed result for total period.



(a) Initial saturated model *(b) Intermediate model, 1991/92 interval*

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[38] t=1.96 corresponds to 95 percent confidence interval (α=0.05) (Hair *et al.*, 1995:144)

Significant regression coefficients[39] can only be found for four of the exogenous variables and the growth in market extension (mexpan) when results over the total five-year period are assessed. No statistically significant regression coefficient can be found between the exogenous variables and growth in export quota (expgr). There is, however, an indirect but weak influence on growth in export quota through an influence of mexpan upon expgr. The latter relationship is not statistically significant. Table 8.1 demonstrates once again the effects of low correlation between the variables. The tabulated values also demonstrate clearly the same lack of temporal stability in the relationships which has been repeatedly noted earlier.

The results of Table 8.1 are the final step towards the causal model. Measures (variables and factors) with a consistent low value of regression coefficients ($\gamma < 0.1$) and low significance ($t < 1.96$) are excluded from the final model[40]. Some measures with occasional violations of these conditions are arbitrarily included in the further analyses following a total assessment, which also includes theoretical considerations.

The reduced set of variables which will be used in the final model and their correlation coefficients for exogenous and endogenous variables are given in Table A6.11.

8.3 Final model

The final model will be approached in stages. First, the path model based on the total panel will be established and discussed. Next, the path models of the different categories of enterprises, as discussed in section 8.1, will be established. The effects of the categorical variables may potentially have two different manifestations: the patterns of significantly loading variables, and the strength of their influence.

8.3.1 Total panel

The starting point for analysing the final model is depicted as Figure 8.3 (a). The regression coefficients and corresponding t-values produced by the LISREL path analysis of this final model are presented in Table 8.2. and summarised in Figure 8.3(b).

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[39] Strictly speaking the γ-coefficients of the LISREL model are not regression coefficients, but their interpretation is analogous to regression coefficients, and consequently they are usually termed as such.

[40] These procedures are consistent with the principle of model parsimony.

Table 8.2 Regression between exogenous variables and export orientation measures. Final model.

		1991/92		*1992/93*		*1993/94*		*1994/95*	
		mexten	*expgr*	*mexten*	*expgr*	*mexten*	*expgr*	*mexten*	*expgr*
exin	γ	0.25	-0.11	0.26		0.12	-0.17	0.16	
	t	6.88	-2.46	7.29		3.23	-4.12	3.86	
cpac	γ	-0.09		-0.06				-0.07	-0.06
	t	-2.95		-1.85				-2.26	-1.54
empl	γ	0.15				0.08	0.05	0.16	
	t	4.91				2.39	2.39	4.60	
spec	γ	-0.06		-0.08	0.14				0.06
	t	-1.89		-2.70	4.19				1.54
locs	γ	-0.23	-0.07	-0.27		-0.28	-0.09	-0.20	
	t	-6.91	-1.58	-7.91		-7.67	-2.14	-5.48	
educ	γ		-0.06		0.06				
	t		-1.53		1.77				
capab	γ	0.12	0.07	0.12		0.21		0.16	
	t	3.70	1.81	3.87		6.17		4.29	
mexten	γ								
	t								
expgr	γ		0.08						
	t		1.76						
Expl. var.		0.34	0.02	0.30	0.02	0.23	0.02	0.27	0.01
N cases		754		848		736		777	
Model fit[41]		+++		+++		+++		+++	

An over-all interpretation of Table 8.2 confirms that all of the variables included in the final analysis occur with significant regression coefficients in

[41] Multiple criteria are used for model fit assessment: GFI >.85, near 1.0 is good; RMSEA ≤.05 excellent, <.08 acceptable, >poor; RMR <.1, near 0 is good; CN N>200 (Hair *et al*, 1995: 682ff). Details are available from the author on request.

one or more intervals, giving support to the general structure of the model. The table also clearly illustrates that the patterns of significant regression coefficients are not stable over these four intervals.

For the endogenous measure growth in export quota (*expgr*), no regression coefficient appears as statistically significant in more than two of the four intervals. There is therefore no support for any stable pattern of relationship between the exogenous variables and growth in export quota.

There are, however, four variables that reappear with statistically significant[42] regression factors with *change in market extension* (mexten) in a majority (at least three of four) of the intervals: *external interaction* (exin), *available capacity* (capac), *size measured by employment* (empl) and *management capability* (capab).

In addition *sales on local markets* (locs) appears with a negative and statistically significant regression factor in all intervals. The negative regression coefficient for this variable indicates a decreasing volume of sales on local markets in conjunction with increasing market extension. This is self-evident and almost a tautology, but confirms the validity of the model. This variable will be omitted in further analyses.

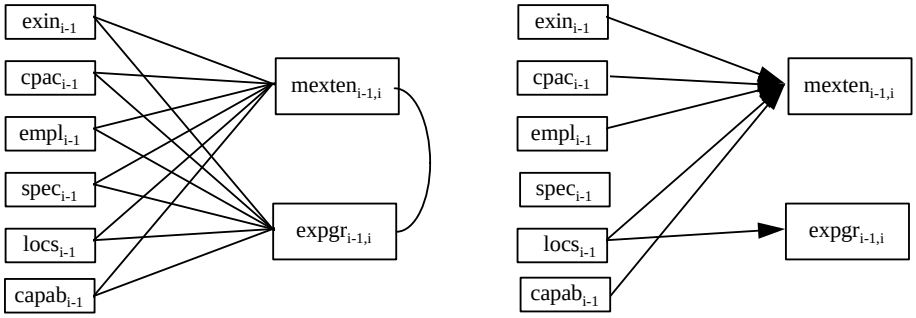
The regression coefficients reported in Table 8.2 vary too much from year to year to be regarded as constants, but a distinct pattern has been found in the regression coefficients for four of the exogenous measures and growth in market extension.

There is no stable correlation coefficient between the two measures of change in export orientation. Growth in market extension and growth in export quota are therefore independent measures (dimensions) of export orientation.

The final total model of these stable interactions over the total observation period of five years is summarised in Figure 8.3 (b). The interesting features of the model are discussed more in detail below.

[42] $t \geq 1.96$

Figure 8.3 Variables influencing export orientation. Final model.



(a) Initial saturated model *(b) Final stable model*

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External interaction

The interaction between the factors *external interaction* (exin) and *growth in market extension* (mexten) is positive and statistically significant in each interval. This means that high values of external interaction are associated with high values of the market extension index.

High values of the external interaction index mean that the enterprises have a high number of external contacts, close contacts with customers, and direct links with foreign representatives. High values of the market extension index mean that the enterprises have extended their activities to a higher number of, and more distant, export markets.

The model confirms that high external interaction is uniformly associated with growth in market extension.

Quite surprisingly, there is no similar relationship between external interaction and growth in export quota. On the contrary, the two statistically significant regression coefficients (1991/92 and 1993/94) are negative, indicating that reduced external interaction is found in conjunction with growth of export quota.

Available capacity

There are low, negative, and statistically significant regression coefficients for *available capacity* (cpac), defined in Table A5.8 in Appendix 5, and *growth in market extension* in two of the four intervals. There is no statistically significant relationship between available capacity and growth in export quota. The interpretation is that growth in market extension is found in conjunction with reduced available capacity. Searching for explanations for this apparent inconsistency would be speculation at this stage. It can be concluded, however, that the data give no support for a general assumption that growth in market extension or growth in export quota are motivated by the desire to utilise free capacity.

Size of the enterprise

There are positive and significant regression coefficients for the *size of the enterprise*, measured by employment (empl), and *growth in market extension* for three of the four intervals. The interpretation is that the larger the business, the greater the tendency to extend the market.

There is no statistically significant and stable relationship between *size of the enterprise* and *growth in export quota*.

Sales on local markets

The regression coefficients point to a strong, consistent, and statistically significant relationship between *sales on local markets* (locs) and *growth in market extension*. There are negative regression factors in two of the years for *sales on local markets* and *growth in export quota*.

The relationships pointed to by this variable come very close to being tautologies. Since the measures for both local and export sales are share of total sales, growth in one of the variables will normally be associated with a reduction of the other. The findings are still of interest, since they confirm the reliability of the two measures of export orientation[43].

[43] The interpretation of this variable also points to the problem of finding the appropriate time lag between cause and effect in causal analyses. Although there is a definite separation in time between the observation of the exogenous and endogenous variables, this time lag may be so short that it is equivalent to simultaneous observations for this process.

Education level of the manager

The education level of the manager, measured by of his *age when ending full time education* (educ), has no significant influence on either of the measures of *change in export orientation*.

Capability of the manager

The factor *capability of the manager* (capab), defined in Table A5.3 in Appendix 5, measures experiential capabilities and language skills of the manager. There are very consistent, statistically significant regression coefficients for this factor versus *growth in market extension*. Statistically significant regression versus *growth in export quota* is only found for one interval. The capability of the manager therefore contributes positively to the process of extending markets, but has little direct influence on the growth of the export sales per se.

Correlation between endogenous measures

Growth in market extension and *growth in market quota* are weakly correlated, and in one interval only. There is no indication in these data that the enterprises secure growth in export sales through market extension. In the set of enterprises of all categories, growth in market extension and growth in export quota are independent measures.

Explained variance

The details of the models vary over the four intervals. The corresponding measures of 'explained variance'[44] are, however, quite stable; between 0.23 and 0.34 for *change in market extension* and between 0.01 and 0.02 for *change in export quota*.

The low value for export quota is related to the problem of identifying a stable set of relationships. There are, apparently, so many independently fluctuating factors which influence growth in export quotas, that it is not possible to isolate the effects of the factors included in the model.

The range of the explained variance for change in market extension indicates that there is a fairly stable and identifiable influence from these factors on market extension. The low value clearly means that there are also several

[44] The sub-model path analysis of the LISREL package computes the 'squared multiple correlation for structural equations, which corresponds with the R^2 measure of regression analyses. This is interpreted as explained variance of the endogenous measures.

other factors, not included in the model, which play an important role in the development of export quotas.

Summary at this stage

The above comments may be summarised in the following regression equation:

$$mexten = \gamma_1(t)exin - \gamma_2(t)cpac + \gamma_3(t)empl + \gamma_4(t)capab + \delta \quad [8.1]$$

The format underlines that the regression coefficients are identified as being time dependent, in the sense that they are different at different points of time. Our analysis has been able to point to a consistent relationship between these three exogenous measures and growth in market extension. The equation depicts the stable element of the change pattern. The stability does not carry so far as having constant 'strength' of these relationships over time.

It should be noted that the relationships of equation 8.1 differ from the relationships depicted in Figure 8.1 as a consequence of the discussion of the variable *sales on local markets.* It should also be noted that the error term, δ, accounts for around 2/3 of the observed variation of market extension.

Growth in market extension and growth in export quota are independent measures (dimensions) of export orientation.

8.3.2 Influence of family ownership

The general structure of the path models for family and non-family enterprises with respect to market extension are identical and consistent with Eq. 8.1, see Tables A6.12 and A6.13 of Appendix 6. There is no stable pattern over time as to which of the categories has the highest and lowest computed value of the regression coefficients.

Family and non-family enterprises alike exhibit large temporal variations as to which variables have statistically significant influence on change in *market extension*. For five of the six exogenous measures there is no distinguishing difference between the two categories of enterprises.

Although not included in Eq. 8.1 due to a lack of statistical significance, the measure *education* invites some reflections, but the results are too ambiguous to indicate conclusions. For non-family enterprises, regression coefficients for education are positive, indicating that long education is associated with a high market extension index. For family enterprises regression factors are negative, indicating that long education is associated with low a market extension index. Can it be that family enterprises are less willing or

able to use education of managers to obtain market extension than non-family enterprises?

The explained variance of the endogenous variable change in *market extension* is in the vicinity of 25% for each interval, and quite similar for family and non-family enterprises.

The differences in change patterns identified for the total sample cannot be attributed to the influence of family ownership.

8.3.3 Influence of region

There are too few observed enterprises for the region BeNe (Belgium and The Netherlands) to establish a reliable path model for this category, see Table A6.14. The calculated values are nevertheless included in the table.

Marked extension

The general traits of the two other regions are in compliance with the structure of Eq. 8.1 for *change in market extension*. However, for the enterprises of *Nord* region there seems to be an increasing influence of the *specialisation index* over time. The negative correlation coefficients imply that increasing values of the *specialisation index* are associated with decreasing values of *market extension index*. This means that specialised enterprises in *Nord* tend to focus on near and/or few export markets. The same trait is not identifiable for the other regions. Similarly, there are indications of positive relationships between the variables *education* and *growth in market extension* in the *Nord* region, but not in *Centr* region. High index of market extension in *Nord* region is associated with enterprises where the manager has a long education. The statistical significance of this relationship is weak and gives cause for posing questions, rather than for proposing a conclusion - as with the similar observation made under the discussion of family ownership.

Explained variance varies between 21% and 30% with the exception made for BeNe. These values are comparable to what is found when testing the whole panel.

Export quota

The regression coefficients found for *changes in export quotas* are weak and ambiguous. There are some, but not consistent, indications of a negative relationship between *external interaction* and growth in export quotas. There are no general regional differences in this respect.

Another feature of Table A6.14 is the dwindling influence of the variable *capability* in region *Centr* over time, while there is no statistically significant influence of this variable in *Nord*.

Extreme caution should be taken in a further interpretation of these findings since explained variance fluctuates between 1% and 28%.

Based on the present model and data, the regional dimension may not fruitfully be pursued further for establishing causality. However, the above analyses clearly indicate that there are aspects of export orientation where the regional dimension is a vital element of explanation.

8.3.4 Influence of industry sector

The path models have all the same general structure for each of the industry sectors, but their similarity ends when values of coefficients are compared.

Wood and furniture is the only industry sector with consistently high explained variance of *growth in market extension* throughout the period. *External interaction* and *capabilities of manager* are the only exogenous variables with consistent, statistically significant relationships. However, also *employment* seems to play an important role for explaining growth in market extension. The same variables are consistently found statistically significant for enterprises of the *mechanical industry*, although with larger temporal fluctuations.

The only consistent factor in the models for enterprises in the *electro industry* is *capability of the manager*. There are no consistent factors for the two remaining industries, *textile* and *food and beverages*.

Even more pronounced than for regions, the exogenous variables with statistically significant relationships with the endogenous variables tend to fluctuate differently for different industry sectors. It is reasonable to bear in mind the interaction between industry sector and region discussed in section 8.1.

8.4 Export orientation and adaptation of the enterprise

The analytical model, see Figures 4.4 and 4.6, postulates functional feedback mechanisms from the export orientation process to enterprise characteristics and to the external interaction of the enterprise. The previous sections of this chapter have analysed the factors influencing the export orientation process. This section will focus on changes induced in the enterprises themselves and in their external interaction as a consequence of the export orientation process.

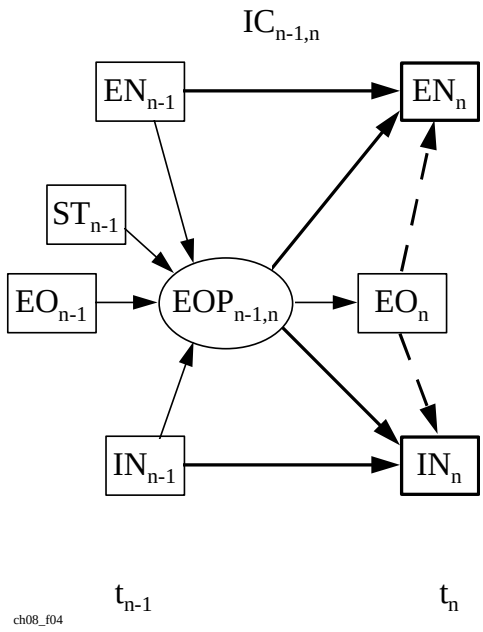
The analytical framework for this purpose is outlined in Figure 8.4 in bold lines. However, since the export orientation process cannot be observed directly, the analysis must be performed using the same dynamic measures for export orientation as above: *change in market extension* and *change in export quota.* This is indicated by the dotted lines in the figure, signifying these differential measures.

Once again, the purpose of the analysis is not to measure absolute strength of any relationships, but to investigate statistical significance and stability of the relationships. Since there is potential interaction between several of the factors, the path analysis model of the LISREL program will once again be used to allow simultaneous analyses.

The measures of enterprise/entrepreneur characteristics and external interaction, which are relevant in this context, are those measures included in the final stages of the previous analyses. An additional requirement for inclusion of variables is that influence shall not be ruled out by practical considerations[45].

[45] An example of such practical considerations: it is very unlikely that a large number of enterprises will change ownership structure to adapt to new requirements as result of export orientation.

Figure 8.4 Enterprise adaptation through export orientation



For this sub-model the following measures will be used:

Measures of export orientation (independent variables):

- *Change in market extension*: i.e. change index market extension, see Appendix 5, Section A5.4
- *Change in export quota*; i.e. change index of export quota, see Section 6.2.4.

Measures of enterprise/entrepreneur characteristic (dependent variables):

- *Entrepreneur capabilities*; i.e. experience in industry, time spent abroad, number of languages with working knowledge, see Appendix 5, Table A5.3.
- *Specialisation*; i.e. value of index of specialisation, see Appendix 5, Section A5.1.1.
- *External interaction*: i.e. value of index of external interaction, see Appendix 5, Section A5.3

The path model used in the analysis is depicted in Figure 8.5 (a). The straight arrows depict relationships over one interval of time, which is one of the conditions for causality.

The curved arrows depict relationships at one point in time, which opens for correlation but no causality. The results of the path analysis are depicted in Table 8.3 and summarised in Figure 8.5 (b).

Once again we find fluctuations from one interval to another. Very few relationships are stable in the sense that they are statistically significant in each interval. Assessed independently, the path models for each year have a very good model fit. The models are not identical, since the magnitude of the regression coefficients, as well as which coefficients are found to be statistically significant, varies over time[46]. Nevertheless, there are some noteworthy common features.

[46] A consideration of equality of regression coefficients is only the first step in comparing structural models . The next step is to subject the models to a hierarchy of tests. The first level calls for comparing the structure of the models, the second level for also comparing error terms, and the third and final level for including the covariance between the concepts (Bollen, 1989:355ff).

Table 8.3 Export orientation and change in enterprise characteristics

	1991/92			*1992/93*			*1993/94*			*1994/95*		
	capab2	*spec2*	*exint2*	*capab3*	*spec3*	*exint3*	*capab4*	*spec4*	*exint4*	*capab5*	*spec5*	*exint5*
$mexten_{i-1,i}$	0.01	-0.02	0.11	0.10	-0.05	0.02	-0.01	-0.03	0.09	0.05	0.01	0.12
γ	0.40	-0.47	3.38	2.83	-1.08	0.40	-0.34	-0.75	2.65	1.51	0.13	3.66
t												
$expgr_{i-1,i}\gamma$	0.11	-0.08	0.13	0.08	-0.05	0.01	0.06	-0.03	0.12	0.06	0.02	0.11
t	2.88	-1.52	3.49	2.14	-1.02	0.32	1.81	-0.60	3.28	1.79	0.52	2.98
$capab_{i-1}\gamma$	0.68			0.67			0.70	0.18	-0.13	0.71		
t	18.48			18.11			20.30	2.81	-2.28	19.21		
$spec_{i-1}$ γ		-0.04	0.65	0.06	-0.08	0.55	0.21	0.06	0.50	0.11	-0.19	0.74
t		-0.82	17.15	1.54	-1.65	11.63	6.12	1.35	12.59	2.93	-4.04	20.27
$exint_{i-1}$ γ		0.47		-0.09	0.50	0.07	0.08	0.60	-0.22		0.61	0.06
t		10.45		-2.66	11.16	1.38	2.37	14.04	-5.06		14.98	1.37
$capab_i$ β								0.32				
t								4.78				
$spec_i$ β						0.11				0.05		0.05
t						2.30				1.16		1.18
$exint_i$ β	0.11			0.08			0.36	0.07				
t	2.99			1.74			6.13	1.61				
Expl var	0.53	0.26	0.59	0.56	0.28	0.37	0.63	0.38	0.57	0.64	0.43	0.63
N		392			379			371			371	
Model fit		+++			+++			+++			+++	

Growth in market extension is positively related with a subsequent growth in external interaction in two of the three intervals (as also external interaction was found to be positively related with and preceding growth in market extension). There is no similar statistically significant relationship between market extension and specialisation or manager capabilities.

Growth in export quota is positively related with subsequent growth in manager capabilities.

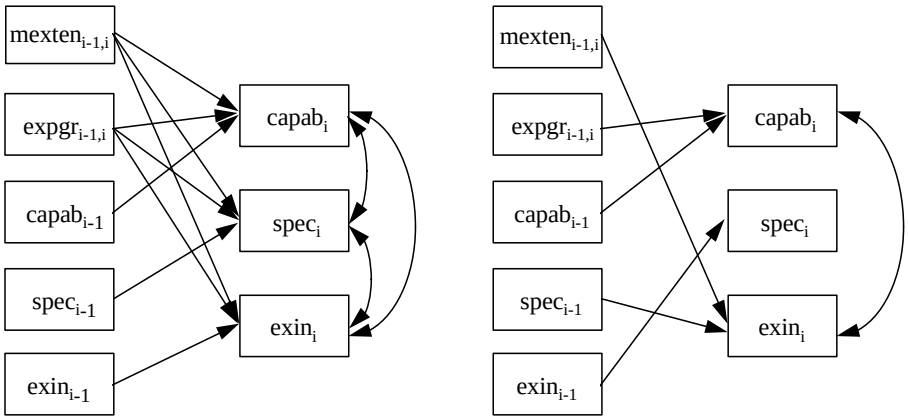
There is no statistically significant relationship between the two measures of *export orientation* and *specialisation*. It is interesting to note that the rela-

tionships seem to be negative, although not statistically significant. The implication is that growth in export orientation is associated with decreasing values of the specialisation index.

Manager capability of one period is strongly and positively related to the capability of the next period, which is a confirmation of accumulation of experiential knowledge. There is no similar temporal within-variable relationship for specialisation or external interaction - which is quite surprising. On the other hand we find reciprocal and strong relationships between specialisation and external interaction. High specialisation in one period leads to high external interaction in the next, and vice versa.

In three of the four intervals external interaction is positively correlated with manager capability.

Figure 8.5 Export orientation and enterprise characteristics.



(a) Initial, general path model

(b) Stable path model

ch08_f05

8.5 Export orientation and total performance

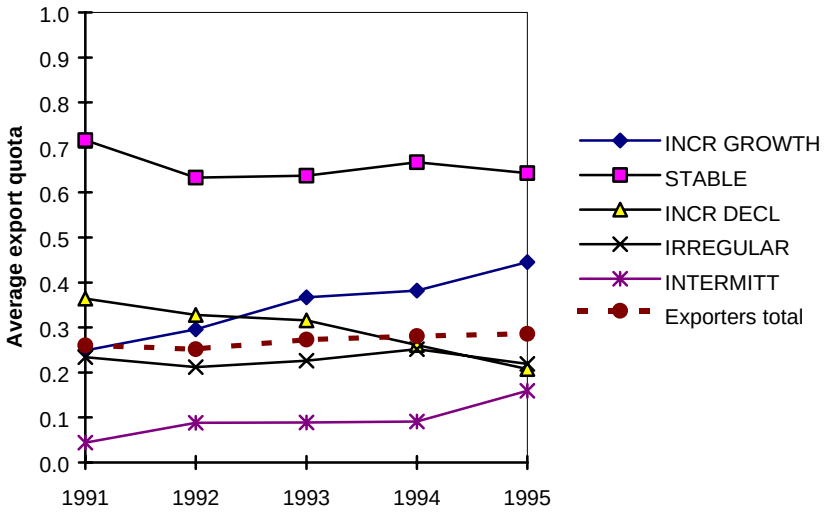
Two measures are used for total performance, depicting very different aspects of performance. The first relates to stability or lack of stability in the commitment to export sales. The categorical measure 'export regularity' is derived by observing changes in the export quota for each enterprise indi-

vidually over the four intervals (five observations), see section 7.1. The second measure is change rates of total sales, giving a ratio scale measure. Both measures depict the dynamics of the process.

8.5.1 Export regularity and export quota

Since change rates of export quota are the basis for the definition of categories, the relationship between changes in export quota and the categories of export regularity would be a tautology. However, there is a potential connection between the level of export sales and regularity in export commitment. Figure 8.6 clearly illustrates this relationship.

Figure 8.6 Average export quota and categories of change patterns



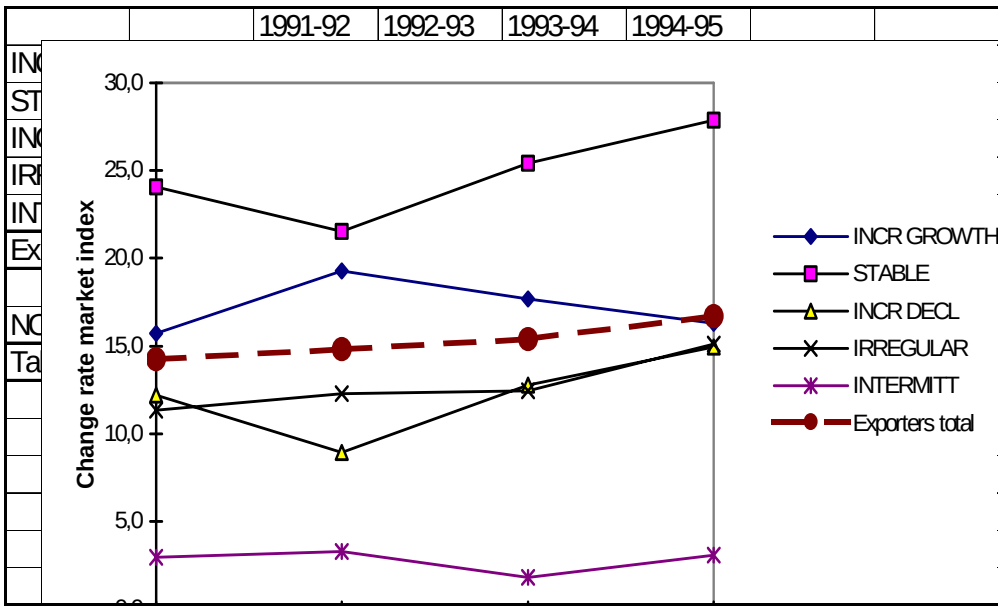
Stable exporters have the highest levels of export sales, and intermittent exporters have the lowest levels of export sales. The differences between the categories are statistically significant at 0.001 level, see Appendix 6, Tables A6.19 and A6.20. Increasing levels of the incrementally growing, and declining levels of incrementally declining, categories verify the reliability of the category measure.

The performed analysis confirms one of the conditions for causality, but does not exclude other explanations; and does not establish the time sequence.

8.5.2 Export regularity and market extension

The measure of market extension is the market extension index, which is a ratio measure. Once again statistically significant differences are found between the categories of export regularity as to change rates of market extension. Stable enterprises are extending their market most rapidly, followed by enterprises in the incremental growth category, see Figure 8.7. Enterprises in the intermittent category have consistently the lowest growth in market extension. See also Appendix 6, Tables A6.21 and A6.22.

Figure 8.7 Average change rates of market index and categories of change patterns



These two figures and the detailed analyses in Appendix 6 clearly demonstrate that average export quota as well as export market extension are related to the categories of export regularity.

8.5.3 Total sales

The relationship between the dependent variable *changes in total sales* and the independent variables *changes in export sales quotas* and *changes in market extension* is explored by regression analysis, see Appendix 6, Tables A6.23 to A6.26. The absolute values of the regression coefficients display much variation from interval to interval, but with some common traits.

The regression coefficient for *growth in export quota* is for each interval positive and statistically significant.

The regression coefficient for *growth in market extension index* is, for one year statistically significant at a level of 5%, but not the other years. In one interval the coefficient is positive, while the other years are negative.

The regression model is statistically significant for each interval, but the values for explained variance (Adjusted R square) are low -- between 5% and 18%.

Table 8.4 Export orientation and total sale. Main elements of regression statistics

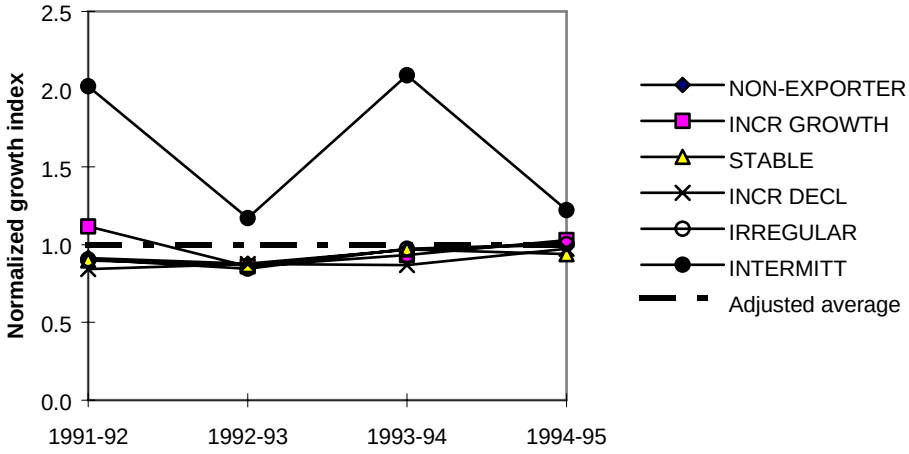
		1991-92	*1992-93*	*1993-94*	*1994-95*
Coefficient for change					
in export quota	*Sign*	+	+	+	+
	Significance	0.00	0.00	0.00	0.00
Coefficient for					
change in market extension	*Sign*	-	-	-	+
	Significance	0.02	0.65	0.94	0.06
Explained variance		0.18	0.07	0.05	0.05
Model significance		0.00	0.00	0.00	0.00

8.5.4 Export regularity and total sales

Although not a part of the initial model, it is clearly of interest to ascertain any relationship between *export regularity* and *growth in total sales*. Tables A6.27 and A6.28 of Appendix 6 show the growth indices for total sales in each of the categories of export regularity. The normalised growth indices are depicted in Figure 8.8.

The only category of enterprises displaying average growth rates constantly different from the other categories is enterprises with an intermittent commitment to exporting. These enterprises have consistently the highest average growth rates of all categories. The average values of growth indices for the other categories are quite similar in each interval, but with varying ranking from interval to interval.

Figure 8.8 Export regularity and growth index for total sales



Similarly, it is also of interest to ascertain whether irregularity in export quota is part of an irregularity of total performance. The possible interaction of the change patterns of export quota and of total sales is analysed in Section A4.5 of Appendix 4. As set out in Table A4.10 no systematic interaction can be found between these two measures. Fluctuations are much smaller for change in total sales than for change in export quota. We also find that there is not a higher propensity for fluctuations in total sales for enterprises with intermittent and irregular change patterns of export quota than for other enterprises.

9 Discussion

The issues taken up in this thesis have been on the research agenda for several years, but this is one of the first occasions when appropriate data have been available for empirically testing on this broad scale (cf. Tables A2.1 and A2.2 in Appendix 2). The approach has therefore been to explore the main features of the data by means of an over-all model. During such a process, many interesting problems and questions have arisen as bi-products of the analyses. Most of these have been outside the scope of the thesis and have, reluctantly, been put aside for future work.

This chapter will address issues related to validity, reliability and interpretation at model level, concluding with discussion of the initial hypotheses and interpretation of the results. The discussions relating to the statistical significance of individual analyses can best be done in direct connection with the analysis in question. These are therefore to be found in the appropriate chapters or appendices. The condition for such division of the discussion is that once issues are rejected, or fail to be supported, at the level of statistical analysis, they will not be used in support at model level. However, failure to find expected results or support of expected relationships is also, in this context, interesting information and will be used in the final discussion.

9.1 Validity

9.1.1 External validity - composition of sample

The external validity issue addresses the extent to which results from the analysis are generally valid and applicable to other populations than the studied sample (Cook and Campbell, 1979). The reason for choosing the present research design has been to maximise the potential for discovering existence of phenomena. As a consequence, the chosen research design presents two potential threats to the external validity of the results. Firstly, the initial sample is stratified in size classes, industry sectors, and nationality. Secondly, the composition of the sample is influenced over time by the processes leading to establishing the panel data set, mainly through auto selection and response rates, attrition of the initial sample population, and ageing of the enterprises of the sample population compared to the total population.

Stratification

As discussed in Chapter 5, the sample of enterprises has been chosen randomly from pre-selected strata. The positive consequence of this strategy has been reduced variance within the sample and an adequate number of observations within the interesting categories of enterprises, which both contribute positively to statistical validity. The negative trade-off is that although one may assume that results are applicable to other 'similar' enterprises, verification by independent study is required to support such assumption. Three main issues should be emphasised in this connection:

- All enterprises are from countries in central and northern Europe, with developed economies, orderly market structures and close proximity to large export markets.
- Compared to the size distribution of enterprises in all participating countries, small enterprises are significantly under-represented and large enterprises equally over-represented (ENSR, 1996).
- The sample includes manufacturing industries while the rapidly growing service industries are not represented.

The aggregate effect of these elements cannot be generalised. However, several phenomena have been identified as being part of the internationalisation process. These phenomena cannot be declared non-existent with the reasoning that exact dissemination of the phenomena is uncertain. The extension of the phenomena beyond the present sample must be resolved in subsequent research where the research method is designed with the purpose of ascertaining the extension of the phenomena.

One important requirement for verification of external validity by repeating the analyses with other samples is that the characteristics of the sample are well defined and explored. This has been one important rationale for meticulously analysing the effects of the categorical variables, industry sector, size class[47], and nationality.

Selection of five year panel

The initial total sample of enterprises was randomly selected within the predefined strata. The same address lists for mailing questionnaires were maintained in each country over the five-year period. For the purpose of the thesis, the panel sample has been constituted by the enterprises voluntarily se-

[47] For some analyses the categorical measure for size: size class has been replaced by the continuous, and more precise, measure: number of employees

lecting to answer four or five times, see discussions in Chapter 7 and Appendix 4. This panel sample consists of 1700 enterprises.

No new enterprise has been added to the total sample after the initial selection. A study of Norwegian non-respondents was done at an early stage to assess the effects of these mechanisms on the composition of the panel (Havnes, 1993), see discussion below.

Response rate

The response rates have typically varied from 15% to 30% in the different countries over the years. However, since the panel sample is used, these individual response rates are not essential for two reasons. First of all, only a small portion of the responding enterprises belongs to the panel sample. Secondly, the panel sample is treated as one international sample with nationality as one variable, not as aggregated national samples. Thirdly, the true size of the total sample in the second through fifth year is not known due to attrition, see below. Table 9.1 can illustrate the issue of response rates. The total number of enterprises in the initial address lists in the seven countries of the panel sample should intentionally be 17500. For practical reasons this number was never reached, among other things because of the limited number of enterprises for some combinations of size and industry sector in some countries.

Table 9.1 Responding enterprises and number of years participating

# years	*1991*		*1992*		*1993*		*1994*		*1995*	
participating	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
1	1575	33.1	1929	36.8	1079	24.6	466	14.3	721	20.2
2	1026	21.6	974	18.6	969	22.1	619	19.0	778	21.8
3	721	15.2	758	14.5	776	17.6	624	19.2	607	17.0
4	637	13.4	787	15.0	776	17.6	753	23.1	671	18.8
5	794	16.7	794	15.1	794	18.1	794	24.4	794	22.2
Total	4753	100.0	5242	100.0	4394	100.0	3256	100.0	3571	100.0

The number of enterprises with four or five years of participation (observations) adds up to less than 1700 (the panel size) each year. The reason for this is that in the group of enterprises participating in four years, some of the enterprises will be missing in each yearly data set.

The panel sample of 1700 enterprises constitutes approximately a 10% response rate of the initial total sample. This low response rate could be expected since there are so many sources of depletion, combined with the long time span of the study. However, the response rate indicates that special attention should be given to possible bias introduced in the sample (Janson, 1981:34).

Nationality

There appears to be a different propensity for responding in the different participating countries. In addition the Dutch survey was not conducted in 1994. This has led to a bias in the panel sample as to the national composition, see Table 9.2. This must be taken into account when interpreting results where cultural values, market proximity or specific national economic condition may influence the results.

Table 9.2 Distribution of nationality of enterprises in panel sample

	4 observations		*5 observations*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
Austria	359	39.6	323	40.7	682	40.1
Switzerland	102	11.3	89	11.2	191	11.2
Sub total Centr	461	50.7	412	51.9	873	51.3
Belgium	48	5.3	15	1.9	63	3.7
The Netherlands	20	2.2	0	0.0	20	1.2
Sub total BeNe	68	7.5	15	1.9	83	4.9
Norway	83	9.2	62	7.8	145	8.5
Sweden	220	24.3	260	32.7	480	28.2
Finland	74	8.2	45	5.7	119	7.0
Sub total Nord	377	41.7	367	46.2	744	43.7
Table total	906	100.0	794	100.0	1700	100.0

Some analyses where nationality has been a specific issue, have required a larger number of observations than available in the national data sets. For these analyses three regions have been defined: *Centr*, consisting of Austria and Switzerland; *BeNe*, consisting of Belgium and the Netherlands; and *Nord*, consisting of Finland, Sweden and Norway, see 8.3.3 and Table A6.14 in Appendix 6. *BeNe* has a significantly smaller number of enterprises than

the two others, but the size distribution of the regions are more similar than size distributions of the individual countries. Furthermore, the cultural, economic, and market conditions of the countries within these regions are sufficiently similar for analyses at this level of detail.

It should be pointed out that the analyses with specific focus on the variable region, see Section 8.3.3, were able to identify different relationships between the exogenous and endogenous variables in the different regions. However, the results are ambiguous and the analyses concluded that the present model and data were not found suited for further exploration of the regional dimension.

Auto-selection

The question of auto-selection refers to the processes leading to the managers' decision to respond or not respond to the questionnaire each year. If these processes are not influenced by the topics of the research, the auto-selection will be neutral to the research problems, and vise versa (Havnes, 1993). For example, if export-oriented enterprises are more motivated to answer questions on internationalisation than domestically oriented enterprises, exporters will presumably be over-represented among the respondents. The results of analyses will consequently exhibit a bias towards 'typical' results for exporters in the analyses, etc.

The effects of auto-selection and attrition, see below, on the composition of the panel sample was studied by the author in a telephone survey of Norwegian non-respondents (Havnes, 1993) after completion of the two first surveys. The main conclusions of this survey with respect to bias as a result of auto selection are that:

1. Large enterprises have a greater tendency to respond, and to respond repeatedly than small enterprises,
2. Exporters (with a high perceived relevance of the topic) had higher response rates than non-exporters, and a higher proportion of twice-responding than once-responding enterprises; and
3. There was no conclusive evidence of different response rates between industry sectors.

Although similar exercises have not been carried out in the other countries of the project, these conclusions indicate that caution should be taken in the design of analyses and interpretation of results. All analyses based on the total sample can be expected to be biased towards 'typical' results for large enterprises and exporters. To compensate for the effect of biased composition of the sample, average values for the total sample have been avoided in the

analyses wherever size effects could be expected. Likewise, non-exporting enterprises have been defined as a separate category wherever that is practical.

Attrition

The results from the study of attrition over the two first years of the Norwegian sample (op.cit.) coincides with other studies (Isaksen and Spilling, 1996; Storey, 1994): There is a higher propensity for discontinuing operation, for whatever reason, for small enterprises than for large enterprises. When this is combined with the knowledge that the rate of attrition is highest and falling over the first five years of existence of an enterprise (op.cit.), the conclusion will be that compared with address lists for the first year, the remaining enterprises in the sample of the fifth and final year will show:

1. A shift towards larger sizes of enterprises, independent of any propensity for growth of individual enterprises,
2. A shift away from enterprises that were newly started at project start (1991),
3. Enterprises that have five more years of experience; and quite importantly,
4. A shift towards enterprises that have exhibited the capability of surviving for five years.

In other words, although the panel study is characterised by entities that are the same enterprises according to their names or identification numbers, the sample has been drained of enterprises without the capability of survival; and the enterprises have five more years of experience in the final observation than in the initial observation.

9.1.2 Construct validity

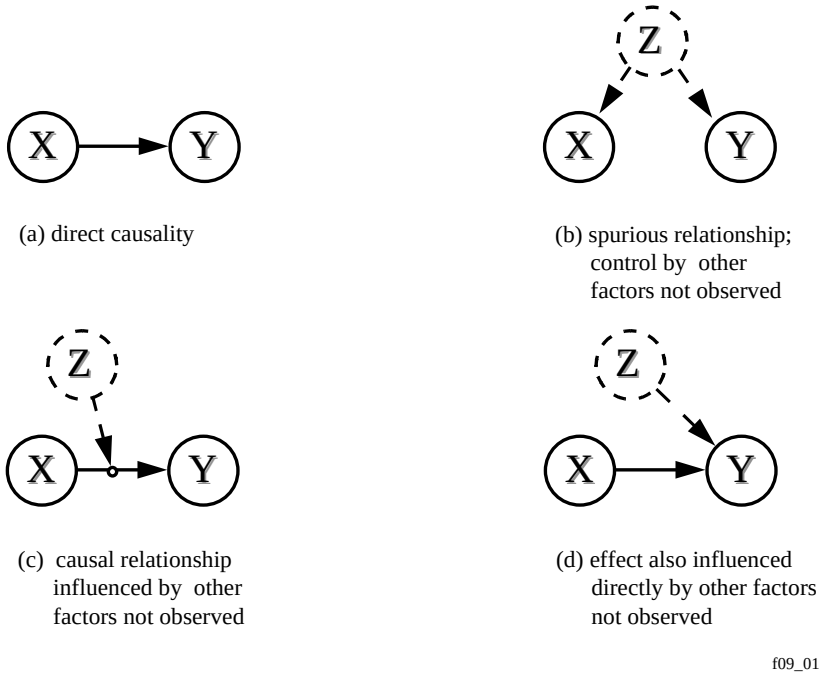
The initial conceptual model, see Figure 4.4, uses a limited number of constructs. These constructs are clearly multi-dimensional and in the study it was attempted to measure them by the interaction of a large number of variables, as suggested by previous research (see i.a. Miesenbock, 1988:50; Holzmüller and Kasper, 1991:64).

In the process of empirical testing of the research model, construct validity has been assured by taking advantage of the fact that we have repeated observations of the same phenomena in a panel. Consistent constellations of correlation coefficients between variables have been interpreted as strong indications of variables tapping the same construct. Lack of consistent con-

stellations is similarly interpreted as the absence of support for assuming that the variables are tapping the same construct. These principles have been used during data reduction by means of factor analyses, see Chapter 7 and Appendix 5.

By following these procedures two different sets of relationships between variables have been defined. One set can be identified in each interval and has been termed *stable patterns*. The other set of relationships is found in one or two intervals, but not in others and has been termed *circumstantial patterns*. Figure 9.1 can be helpful in distinguishing between the roles of stable and circumstantial patterns in the search for explanations of enterprise development.

Figure 9.1 Some alternative explanatory models for correlation between observed cause (X) and observed effect (Y)



For factors where stable patterns are found, explanations for observed correlation should be sought in models of direct causality (a) or strong spurious relationship (b) from a set of factors that were not included in the research model. The circumstantial patterns could be the result of coincidence without any causality. The explanation could, however, also be found in factors that are not observed, but are intervening in the interaction between exoge-

nous and endogenous variables (c). Alternatively unobserved factors could influence the endogenous factors directly in addition to, independently of, and partly masking the effects of exogenous variables (d).

Since the factors Z are not observed, there is no way of empirically testing the alternative explanation models outlined in Figure 9.1.

Alternative explanations - export orientation

The exhaustive list of variables selected on the basis of earlier research suggests that there are few possibilities of significant factors that are not observed; but the possibility of significant, unobserved factors cannot be excluded by these analyses. The choice of theoretical perspective and analytic model also illuminates certain phenomena while others are obscured, cf. Section 1.3.

The importance of this point is clearly demonstrated by looking at the role of *resources*. The results from the analyses reported here do not support a hypothesis of resource driven export orientation. This is in contrast to the findings of Ahokangas (1998) who used a section of the Interstratos data set partly overlapping the panel data set used here. He concludes that: ".....seen from the perspective of a firm within a network, three fundamental dimensions of the concept of internationalisation become apparent: development or accumulation, control and interdependency of available resources." (*ibid*:156). The focus of the model used by Ahokangas was specifically to study the role of resources as an explanatory factor in the internationalisation process. In our model the focus has been more directed towards identifying and explaining longitudinal change patterns of enterprises. The differences in approach have decided to what extent the role of resources has been exposed by the analyses.

The theoretically derived measurement model, developed in Chapter 6, included a limited number of variables depicting generic properties of the enterprises. In addition to the variables defining the dimensions of stratification: *nationality*, *industry sector*, and *size class*, *family ownership* is also included. Furthermore, one exogenous variable, *specialisation,* and one endogenous variable, *market extension*, have been generated as metric variables by combining categorical and metric variables. The validity of both of these sets of variables should first of all be assessed by their ability to discriminate in the analyses of the observed phenomena (Judd *et al.*,1991:56). Secondly, it is important that these variables and the procedures for generating them are clearly defined to facilitate future assessment of their validity by testing of the same variables in another research setting.

The variables and procedures are clearly defined in Appendix 1 and Appendix 5. The analyses give a certain support for discriminant ability, but in many cases not at statistically significant levels, see Appendix 6.

The set of measures designed to capture dimensions of the enterprise and the entrepreneur, the external interaction of the enterprise, and stimuli of export orientation were introduced on the basis of the literature review. These measures failed to a large extent to find support in the subsequent factor analyses when the analyses were repeated using each year as a cross-sectional sample, see Chapter 7 and Appendix 5. These analyses demonstrate that:

1. Factor analyses indicated other patterns of association between the measures (exogenous variables) than hypothesised in the theoretical measurement model developed in Chapter 6,
2. Most of the factors identified in cross-sectional factor analyses were not stable when the analyses were repeated in subsequent years, indicating that the observed association between exogenous variables to a large extent is circumstantial,
3. And this, in combination with low explained variance for factor analyses as well as path analyses, support an assumption that there are (a number of) other influencing factors than those included in the present study.

The analyses have identified four concepts with stable patterns of association between the measures and also stable roles in the investigated causal models: *external interaction*, *available capacity*[48] (negative influence), e*mployment* (size), and *capability of entrepreneur*, cf. Table 8.2 and Equation 8.1. Repeated similarity in the results over the four investigated intervals give strong support to the validity of these factors. The discussion above also supports the position that there are other influencing factors, which have not been captured by the present model.

Alternative explanations - export regularity

There is of course one possible explanation that internationalisation is a random process. However, it is more likely that there are one or more influencing factors that are not included in the model, cf. Figure 9.1.

[48] The regression coefficient for the factor *capacity* was found to be negative, indicating that decreased capacity is associated with increasing export quota. The most likely interpretation is that free capacity has been reduced as a result of increased export.

The causal model investigates relationships between export orientation and export regularity. However, the initial hypotheses also take into account the possibility that different change patterns may be explained by specific national conditions or specific situations in industry sectors, or they may merely reflect different levels of formality in small or large enterprises. These possible explanations have been controlled for individually by cross-tabulation and χ^2 statistics, see Appendix 4, Tables A4.3 through A4.5.

Nationality

Although the interpretation of significance statistics are influenced by the small number of observations for enterprises from the Netherlands, there are clear differences between the frequency distributions of the countries, see Table A4.3. The Swiss enterprises are the only group where the incremental growth category has highest frequency, followed by irregular growth. Among the Austrian enterprises we find stable as the most frequently found category, followed by irregular growth. Among Belgian enterprises we find stable and irregular change categories equally frequent as the most common categories. The Nordic countries constitute a third group where the irregular category is the most common, followed by incremental growth.

The Nordic countries have longer distances to the largest European markets than the other countries. This gives a certain support to the argument that increased distance has a negative influence on competitive positions, which again reduces the ability to maintain stable export rates, see discussion in section 4.4.3 in connection with hypothesis $H_{3,1}$.

In spite of the national differences, we find strong common traits. The irregular category is the most, or second most, frequently found change category in each country. Furthermore, we find that the irregular or the intermittent categories are found in more than 40% of the enterprises in all countries with the exception of the Swiss enterprises.

As pointed out by Thomas and Araujo (1985:51), most of the studies of export orientation have a very limited geographic scope. Leonidou (1995b:40) similarly points to the need for more cross-cultural studies. The lack of cross-national comparative studies is also confirmed by the summary of contemporary empirical research in Appendix 2 Table A2.2. One of the rare exceptions to this is a study of (West) German and British manufacturers in 1982 (Schlegelmilch, 1986a; 1986b). The countries in question as well as the conceptual model are different from those in this study. Nevertheless it is interesting to note that Schlegelmilch (1986b:253) finds attitudinal differences between manufacturers from these two countries. He also finds different discriminating factors between exporters and non-exporters (1986a:59-

61), but also concludes that there are similarities in export behaviour profiles in the two countries. A similar combination of common traits and culturally dependent differences was identified by a comparative study of strategic issues related to internationalisation by Schneider and de Meyer (1991).

Industry sectors

The test statistics do not support any hypothesis of interaction between the variables industry sector and change pattern, see Table A4.4. For four of the industry sectors frequency distributions of the categories are very similar to the total panel distribution: The irregular category is most frequent, followed by the incremental change category. For the food and beverage sector, the irregular category is even more frequent than for the others - more than 50% of the enterprises, followed by the stable category with 20%. However, the number of enterprises in the panel from this category is too low to influence the test statistics strongly.

In the above-mentioned study, Schlegelmilch (1986a:62) also finds that industry sectors (food and mechanical engineering) have different values for discriminating factors of exporters versus non-exporters. Besides this, none of the cited empirical studies provides any cross-industry comparison.

Size categories

The enterprises continuously change their number of employees throughout the observation period, and consequently their sizes categories may change, while the change categories are constant (cf. Davidsson, 1994; 1996). The cross-tabulations based on size classes at each observation are therefore different, but with strong common traits. In all years there are statistically significant differences between the size categories as to the distribution of the categories of change patterns, see Table A4.5. The frequency of the intermittent change pattern decreases with increasing enterprise size. Intermittent export pattern is typical for the small enterprise. The opposite is found for the stable category: increasing frequency with increasing firm size. But, quite interestingly, the irregular change pattern is found most frequently, or second most frequently, in all size classes. With the exception of the smallest enterprises, the incremental growth category was found second most, or most, frequently in all categories.

Summing up

The frequency distributions of the categories of second order change patterns for export quota are influenced by all of the three categories used to define the strata of the initial sample: nationality, industry sector and size classes.

However, in spite of these influences, some distinctive common traits emerge:

- The irregular change pattern is found as the most, or second most, frequent change pattern independent of categories.
- The incremental growth pattern is, with very few exceptions, found as second most, or most, frequent change category.
- The stable category is a category of the large enterprises - the frequency increases with increasing size category.
- The intermittent category is a category of the small enterprises - the frequency increases with decreasing size category.

These common traits, in spite of the observed intervention of the stratification variables, underline the general nature of the change patterns:

1. The irregular change pattern emerges as a genuine pattern of behaviour, which is modified, but cannot be explained by intervention of the analysed variables.
2. The intermittent change pattern is similarly found throughout the panel, but for this category we find strong interaction with size.
3. Together these two categories outline an extremely flexible and adaptive approach to exporting, which is found in around 40% of the enterprises throughout the observation period.
4. The proportion of the enterprises which are categorised as incrementally growing or stable constitutes 45% to 50% of the panel. These are the categories that comply with the various change models which are based on the assumption of incremental and continuous change, see Section 1.2.

9.1.3 Statistical validity

Statistical significance

Wherever there is a question of choice of level of statistical significance of tests, test levels have been set to $\alpha = 0.05$. Wherever test results have been part of a standardised report, the actual figures from the report have been presented.

The methods of analyses of the association between variables are based on correlation coefficients. For correlation coefficients a high number of observations tend to increase statistical significance even when the association be-

tween the variables is very low. Chi-square goodness of fit tests used in the LISREL program have an increasing propensity for rejecting models with an increasing number of observations (Bollen, 1989). Statistical significance can therefore not be used uncritically at a pre-defined level of acceptance.

The results from tests of statistical significance are reported in connection with the respective analyses.

Item non-response

One common problem when a large number of measures are used in analysing is caused by lack of response for single items of the questionnaire. This is especially critical for panel studies (Hsiao, 1986) with repeated options for item non-response. One option is to disregard cases with non-response. By attempting this approach for one specific analysis, the available set of cases was reduced from 1700 to 43, see footnote 3 of Chapter 8. Another approach is to replace missing values by 'representative' values, for instance mean values for a specific category.

For the many methods of analysis which are based on correlation coefficients, a third option is available through pairwise deletion of variables. The practical consequence of the last option is the same as replacing missing item values with the mean value of the (sub) set of data in question.

Taking into account that the purpose of the present study is to investigate a new area and general features of the development model, the last approach has been selected. By doing so, the number of observations (cases) included in the analyses is maximised, which again maximises the use of available information, which in turn increases statistical validity. The disadvantage of this approach is that the true distributions of data for the items in questions are distorted, thus reducing external validity.

Low correlation factors

Matrices of correlation coefficients are the basic instruments for depicting and analysing relationship between factors. The matrices displayed as part of the factor analyses as well as the matrices used as input variables for the LISREL analyses, see Appendix 6, rarely contain correlation coefficients with values above 0.4. Most commonly the values are below 0.2. First of all this caused problems in the further analyses with the purpose of identifying stable multi-dimensional factors and causal model with high values of regression factors. But the low correlation coefficients also give room for interesting interpretations. One possible explanation is that enterprises are very independent in their assessment of which constellation of factors are

important, and also that they change their assessment over time – all in accordance with perceived changes of the circumstances.

Two concepts emerge from this line of reasoning: individualistic approach and flexible approach. *Individualistic approach* implies that each enterprise has its own approach to solving problems and pursuing opportunities. *Flexible approach* implies that the enterprise changes this approach over time to suit its perception of present and prospective circumstances. The *approach* is here interpreted to be those factors which are perceived simultaneously and in conjunction as important, and how these in combination contribute to the change process of the enterprises.

9.1.4 Model representing hypotheses

The question of compliance between the model and hypotheses concerns far more than the number and definitions of concepts, the measures used to tap the concepts, and the relationships between the concepts. An inquiry into these elements is part of the routine testing procedures and is addressed in other parts of this thesis. Since we are analysing data collected at different points of time, the time element itself becomes an important part of the model. Two issues need to be considered in this context. The first relates to the selection of the basis for assessing changes, the second relates to the length of the time interval between observation and its appropriateness to map the changes.

Regression fallacy

In connection with longitudinal studies discussions often arise around what is known as the regression fallacy. The practical manifestation of the regression fallacy is that analyses according to categories, for instance growth of export quota for different size categories of enterprises, give different results when initial or end categories of the time intervals are selected as the basis for the analyses. This is specifically important in panel studies where the objects of study are followed individually and may change categories of the independent variable over time. The problem has been much discussed (Friedman, 1992; Davis *et al.*, 1993; Davidsson, 1994 and 1996; Havnes, 1996b). As pointed out by Havnes (1996b:7) the option of using end point observations as the basis is not relevant for analyses of causal relationships. If the observed variables are hypothesised as the cause of any observed change over an interval of observation, the cause must precede the effect.

Consequently initial values of exogenous variables are applied for all analyses in this thesis.

Interval length

As discussed in Chapter 4, interval length decides the resolution of observation of changes. If intervals are too long, vital information on resulting changes may be lost because the process may have reversed in the time interval between two observations. Reducing the length of the interval will increase the costs of data collection and also increase the influence of random variations and therefore complicate statistical analyses.

The question of interval length is also closely related to the interpretation of causality. The notion of X causing Y implies that Y should occur simultaneously with X or within some specified time interval after X (Cook and Campbell, 1979:17). The observation of the phenomenon Y must therefore be done late enough for manifestation of Y and early enough to avoid other possible influences on Y.

The interval for data collection in the present project was for practical reasons chosen to be one year.

When we apply this reasoning to the results of the analyses, it is clear that during the one-year interval between observations, changes may have taken place in many factors outside our model, the *unobserved factors* of Figure 9.1. Too long interval length will give too much opportunity for influence by the unobserved factors. Too short interval length will give too little time for the hypothesised processes to yield observable effects. In the study of unknown processes, there is no way of *a priori* assessment of appropriate interval length. Furthermore, unless interval length is made a specific issue of the research problem, *a posteriori* assessment of the potential effect of selecting other interval length is not possible. This is once again a problem that cannot be analysed within the present data set. Instead caution must be exercised during interpretation.

9.2 Reliability

The questions of reliability cannot be seen independently of the discussion of validity above: To what extent has the research model been able to create an instrument that is able to measure the intended phenomena? However, reliability also requires that potential errors intrinsic to the chosen methods of statistical analysis are under control. In practical terms this means control of data suitability for the methods in question and tests of reliability of results when applicable.

Due to the low number of observations for some of the phenomena, the split sample option for testing reliability has generally not been available. Instead the panel sample invites use of the principle of consistency over time. Thus

the analytic approach of identifying stable factors or stable patterns of relationships also ensures reliability. The same approach has been used in bivariate analyses such as analyses of variance and χ^2 analyses.

The details of discussions of reliability on this level are found adjacent to the results from actual analyses in Appendix 4 and Appendix 6. Wherever feasible, the following criteria have been applied:

Table 9.3 Applied methods for assessing reliability

Statistical tests	*Criteria used*
Factor analysis	Chronbach's α, consistency over time, re-test of rejected variables by LISREL measurement model
Correlation coefficients	significance, consistency over time
Cross-tabulation	χ^2 statistics, consistency over time
Analysis of variance	Levene test for homogeneity of variances
Path analysis	GFI, RMSEA, RMR, CN, t-values, explained variance, consistency over time

Another indicator of the reliability can be found by comparing these results with the analyses performed by Ahokangas (1998). As mentioned above, his model and research approach are different from the present model. His study is therefore based on a section of the Interstratos data set which partly overlaps, and partly differs from the variables used here. His selection of enterprises also only partly overlaps the panel sample used here. The third difference is that his study is based on the years 1991, 1993 and 1995, with the differentials over the total period 1991-1995 constituting the variables for his analyses. In spite of these differences, Ahokangas finds the same low correlation coefficients, and makes the same inferences concerning differences between individual firms (*ibid:*131).

The comparison between these two studies confirms the reliability of the testing methods.

9.3 Support for hypotheses

Returning to the hypothesis developed in section 4.4, the analyses have produced varying degrees of support:

H_1 *There exist other change patterns for development of export rates than the incremental growth pattern.*

Four categories of growth patterns have been identified in addition to the incremental growth pattern, see Table 7.2 and Appendix 4. The stable and incremental change patterns are consistent with and may be explained by a gradual development model, such as a stages model (Reid, 1981; Thomas and Araujo, 1986; Miesenbock, 1988) or the Uppsala model (Johanson and Vahlne, 1990). The almost equally large proportion of enterprises following irregular or intermittent patterns is consistent with the authors claiming that there is no empirical support for the stages models (Turnbull, 1987; Andersen, 1993; Leonidou, 1995b; Leonidou and Katsikeas, 1996). A similar temporal development of export commitment as the intermittent category has been identified by Christensen and Jacobsen (1996), but with this exception, none of the empirical studies examined have addressed this topic.

The hypothesis is supported.

$H_{2,1}$ *Small and large enterprises will exhibit different change patterns in their export quota.*

For different size classes of enterprises, different frequency distributions of the change categories of export quota have been found, see Table A4.5. However, the irregular change pattern indisputably also plays an important role among the largest enterprises of the panel.

The hypothesis is supported in its stated form.

$H_{2,2}$ *Enterprises from different industry sectors will exhibit different change patterns in their export quota.*

The irregular change pattern is represented by a higher percentage of enterprises in food and beverages industries than in the other industry sectors, combined with a stable pattern as second most frequent. For the other industry sectors distributions are much the same as the total sample averages. Sector differences are not statistically significant, see Table A4.5. This issue has not been addressed in any of the cited research.

The hypothesis is not supported

$H_{2,3}$ *Enterprises from different countries will exhibit different change patterns in their export quota.*

There are national differences as to the distribution of enterprises in categories of change patterns. (However, the irregular change category of export quota encompasses more than 25% of the enterprises in all countries.) This issue has not specifically been addressed in any of the cited research. However, the results are consistent with the findings of Schneider and de Meyer (1991) that entrepreneurs from different cultures have different interpretations of threats and opportunities in relation to the issue of internationalisation.

The hypothesis is supported.

$H_{2,4}$ *Enterprises with entrepreneurs who put little emphasis on planning will have a propensity for intermittent or irregular change patterns of export quota.*

The factor *propensity for planning* was identified in the process of data reduction, see Table A5.6 of Appendix 5. However, this factor failed to correlate with the other exogenous variables, Table A5.7; and also failed to correlate with the endogenous measures, see Table A6.9 of Appendix 6. The factor is therefore omitted in the final causal analysis. This issue has not been addressed explicitly in any of the cited research.

The hypothesis is not supported.

$H_{2,5}$ *The personal attributes of the manager will interact with development of the export orientation of the enterprises.*

The factor *capability* has been identified as part of the regression equation for growth in market extension. Quite interestingly this factor is composed of the variables *years of experience in industry, weeks spent abroad past three years,* and *number of languages spoken by management team.* These variables depict experiential knowledge and communicative skills. No relationship has been established with the tested measures of attitude, nor with the measure of formal education. Likewise no support has been found for a relationship between personal attributes of the manager and growth in export quotas.

These findings are consistent with, but not identical to, previous findings on the relationship between personal attributes of the entrepreneur and export orientation (i.a. Jonston and Czinkota, 1986; Schlegelmilch, 1986b; Gomez-Mejia, 1988; Holzmüller and Kasper, 1991; Manchini and Prince, 1993; Calof and Beamish, 1995; Westhead, 1995).

In spite of these interesting limitations, in the stated form, the hypothesis is supported.

$H_{2,6}$ *External stimuli will dominate over internal stimuli in enterprises with irregular and intermittent change patterns, internal stimuli will dominate over external stimuli for enterprises with incremental growth, incremental decline, and stable change patterns.*

The analyses failed to distinguish between external and internal stimuli. This is contradictory to what was found by Leonidou (1995a:149) in his review of empirical studies. One possible explanation for this discrepancy could be the different results obtained in cross-sectional and longitudinal approaches. The results from factor analyses of the presumed measures of stimuli could only be interpreted in a topical context, see Figure 7.2. Only one of these factors, *capacity*, had a high enough correlation with the exogenous variables to be included in the final causal model. Weak influence was identified on growth in export quota but with the opposite direction from what was expected, see Figure 8.3.

The hypothesis is not supported.

$H_{3,1}$ *Enterprises with stable or incremental growth change patterns of export quota will have a higher average export quota than enterprises with intermittent or irregular change patterns.*

Enterprises with a stable export quota have highest average export quotas for all five observations, see Table A6.19 of Appendix 6. The average export rate for enterprises with incremental growth change pattern is lower than the average for all exporters in the first observation, but increases to above average, second only to stable exporters, in the final observation. This issue has not been specifically addressed in any of the cited studies. The findings contradict the arguments developed from recent strategic literature (i.e. Porter, 1990; Mintzberg, 1998a; 1998b; Quinn and Voyer, 1998), but are consistent with Bhide's (1990) claim that successful entrepreneurs are recognised by their ability to act on leverage provided by external change as opposed to diligent planning.

The hypothesis is supported.

$H_{3,2}$ *Enterprises operating in distant export markets will have more propensity for stable or incremental growth change patterns than enterprises operating in near export markets. Enterprises with irregular*

and intermittent change patterns will predominantly operate in near export markets.

For enterprises with their most distant markets outside Europe, a stable change pattern is most commonly found followed by the irregular growth pattern. These findings are consistent with the arguments developed from the studies by Reid (1981), Holzmüller and Kasper (1990) and Johanson, (1990).

The hypothesis is supported.

$H_{4,1}$ *Growth in export quota will be positively correlated with growth in total sales.*

A change in export quota has been found positively correlated with a change in total sales, see Table 8.4. This result supports previous studies claiming that exporting is a strategy for growth in total sales (Craig, 1993; Chetty and Hamilton, 1996; Christensen and Jacobsen 1996).

The hypothesis is supported.

$H_{4,2}$ *Enterprises with stable or incremental growth change patterns of export quota will exhibit higher growth in total sales than enterprises with irregular or intermittent change patterns.*

The highest growth rates were found for enterprises with intermittent change patterns, see Figure 8.8 and Table A6.28 of Appendix 6. This issue has not been addressed explicitly in any of the cited previous studies. The closest comparable result is that of Christensen and Jacobsen (1996) who concluded that regular exporters had stronger growth in total sales than non-exporters among newly formed firms.

The hypothesis is rejected.

H_5 *Enterprises with irregular or intermittent change patterns of export quota will have a high propensity for irregular change patterns in growth of total sales.*

Enterprises with irregular or intermittent change patterns in their export quota have a lower than average propensity for irregular change patterns in growth of total sales. Enterprises with irregular growth in export quotas have a higher than average propensity for incremental growth in total sales. Enterprises with intermittent change patterns have a higher than average propensity for stable total sales, see Appendix 4, Table A4.8. Again this is-

sue has not been addressed in previous studies. The arguments developed from recent strategy literature (Johson and Scholes, 1993; Minzberg, 1998a) have not been supported.

The hypothesis is rejected.

9.4 Interpretation of results

9.4.1 Total assessment of hypothesis testing

The hypotheses were formulated to allow stringent testing of the theoretically derived analytic model. The hypotheses have received varying degrees of support, as presented above. An important question is whether or not the combination of support, lacking support and rejection allows any conclusions with wider implications than the individual hypotheses. The hypothesis test results are summarised in Table 9.4.

Table 9.4 Summary of hypothesis tests

Hypothesis		*Support*	*No support*	*Reject*
H_1	*There exist other change patterns for development of export rates than the incremental growth pattern.*	✓		
$H_{2,1}$	*Small and large enterprises will exhibit different change patterns in their export quota.*	✓		
$H_{2,2}$	*Enterprises from different industry sectors will exhibit different change patterns in their export quota.*		✓	
$H_{2,3}$	*Enterprises from different countries will exhibit different change patterns in their export quota.*	✓		
$H_{2,4}$	*Enterprises with entrepreneurs who put little emphasis on planning will have a propensity for intermittent or irregular change patterns of export quota.*		✓	
$H_{2,5}$	*The personal attributes of manager will interact with development of the export orientation of the enterprises*.	✓		
$H_{2,6}$	*External stimuli will dominate over internal stimuli in enterprises with irregular and intermittent change patterns, internal stimuli will dominate over external stimuli for enterprises with incremental growth, incremental decline, and stable change patterns.*		✓	

Cont./

Table 9.4 Summary of hypothesis tests /Cont.

Hypothesis		*Support*	*No support*	*Reject*
$H_{3,1}$	*Enterprises with stable or incremental growth change patterns of export quota will have higher average export quotas than enterprises with intermittent or irregular change patterns.*	✓		
$H_{3,2}$	*Enterprises operating in distant export markets will have a greater propensity for stable or incremental growth change patterns than enterprises operating in near export markets. Enterprises with irregular and intermittent change patterns will predominantly operate in near export markets*	✓		
$H_{4,1}$	*Growth in export quota will be positively correlated with growth in total sales.*	✓		
$H_{4,2}$	*Enterprises with stable or incremental growth change patterns of export quota will exhibit higher growth in total sales than enterprises with irregular or intermittent change patterns.*			✓
H_5	*Enterprises with irregular or intermittent change patterns of export quota will have a high propensity for irregular change patterns in growth of total sales.*			✓

There can be no question that these empirical tests support the initial proposition that the dynamics of internationalisation, for a significant proportion of enterprises, have different characteristics than those which can be explained by incremental change models.

There are statistical differences in the frequency distribution of the change categories which can be attributed to enterprise size categories as well as to their nationality. In spite of these distribution differences, the statistical analyses clearly demonstrated that the *irregular change category* is a genuine feature which is found among more than 25% of the enterprises across all size categories, nationalities and industry sectors.

No association has been found between change categories and expressed emphasis on planning, nor on assessment of importance of external and internal stimuli.

The stable and incremental growth change patterns are strongly associated with enterprises with high export quotas and enterprises operating in distant export markets. The analyses cannot indicate what is cause and what is effect in this relationship.

The positive correlation which has been found between growth in export quota and growth in total sales seems to indicate that exporting is a growth strategy. However, it is also important to recognise that irregularity and even intermittence in exporting are *not* indicators of failure. The highest growth rates of total sales were consistently found among the enterprises with intermittent export sales; and irregularity or intermittence in exporting were not reflected in similar fluctuations in total sales.

9.4.2 Gradual change model

The empirical results challenge the dominating role of the gradual or incremental models for explaining internationalisation. The frequency of enterprises with stable or incremental growth change categories is quite similar to the frequency of enterprises with irregular or intermittent change patterns. Although interactions have been found between parameters which characterise enterprises and propensity for the various categories of change patterns, these interactions cannot explain the existence of other categories than the stable and incrementally changing.

Equally important is the verification of the central role of the number of observations. An enterprise which appeared to be stable over two observations did not necessarily meet the criteria for stability when more observations were included. Therefore, when reporting on dynamic properties of business development processes, the number of observations as well as the interval length are essential for the interpretation of results.

9.4.3 Adaptation of modes

The notion of a changing approach to suit situations is supported. As an example of this, external interaction is positively related with market extension, but negatively related with export quota. This means that an enterprise extends its network while expanding the geographical market basis, but focuses its external interaction when consolidating through expanding its exports share of total sales.

The fact that stable and incrementally growing change categories are found to have highest average export quota raises the question of the roles of *maturing* or *commitment*. One possible interpretation can be that it takes a certain time to reach the level of experience necessary to be successful in any market. Once this is attained the enterprise is able to stabilise at a high level commitment in this market. This interpretation complies with the Uppsala model, see Section 3.2.3, and builds on the notion of consistency as the foundation for success. However, other results are not in support of this in-

terpretation. When we use growth in total sales as the criterion of success, enterprises of the intermittent change category have been found most successful while there is no difference between the other categories.

9.4.4 Individualistic and flexible SMEs

The initial stages of establishing the causal models revealed that correlation coefficients generally were low and the pattern of low and high coefficients was not repeated in successive years. This may be interpreted as a problem of reliability, but can equally probably be interpreted as mapping of actual differences across enterprises each year and across time for each enterprise. The latter interpretation opens up for interesting further deliberations.

Assuming that the measurements are reliable, low correlation coefficients for most of the variables mean that the enterprises have different perceptions of their circumstances. When low correlation coefficients also include the endogenous variables, the interpretation can only be that there are individual differences as to the interaction patterns between exogenous and endogenous variables. If these interaction patterns were stable over time and independent of the circumstances, the patterns would be repeated in subsequent correlation matrices. This not being the case, the only interpretation can be that enterprises adapt their assessments and approaches over time to changing circumstances.

Analytic support for this line of reasoning can be found by the fact that the LISREL measurement models, which are similar to the factor analyses, depict varying patterns of covariance between the exogenous variables. Further support is found in the fact that the path analyses, similar to regression analyses, depict varying patterns of covariance between the exogenous variables and the endogenous variables. Similarly the low explained variance for the path models implies that there are other influencing factors. Since these are not stable over time, however, they are not accepted as a genuine factor and cannot be included in the model.

9.4.5 Other possible explanations

The analyses have not been able to pinpoint one strong, decisive factor for the development of export orientation of enterprises. Rather, the statistical analyses have been 'disturbed' by the volatility in the constellation of factors that influence the process. There are therefore numerous 'explanations' where the vague concept of 'circumstances' seems to be more descriptive than the more precise concept 'factor'.

During the analytic phase a number of possible explanations outside the scope of the research model have emerged, cf. the Z vector of Figure 9.1.

The first of these is at a conceptual level and relates to the change mechanisms, namely the approach of the enterprises to flexibility. An overall assessment of the results indicates that there might be one group of enterprises which use flexibility as their source of competitive strength, while others follow strategies that are better characterised as persistent. Flexibility or persistence may reflect generic properties at strategy level, but may also be transient phenomena which are part of the development of enterprises.

The analyses could not identify any significant relationship between the used measures of resources and export orientation. The analyses have revealed unexplained negative correlation between free capacity and export orientation. More and better differentiated measures of resources are required to ascertain the role of resources for internationalisation of enterprises.

A third point, which could conceivably provide some explanation, could be sought in the interaction between product specialisation and market structure, with special focus on one dimension of the product; consumer or industrial products.

10 Conclusion

10.1 Returning to the initial questions - main findings

The research objectives were outlined in a few questions in Chapter 2. It is now interesting to return to these questions and find out to what extent the research has been able to provide answers.

> *What categories of change patterns can be found for exporting, and how frequently are the different patterns found?*

In addition to the continuous non-exporter, five categories of change patterns for export quota have been identified: incremental growth, stable, incremental decline, irregular and intermittent. The same categories can be identified if the absolute measure value of export sales is used instead of the relative measure of export quota.

The frequency of enterprises assigned to the various change pattern categories depends on how the delimitation of the stable category is defined. For the chosen delimiting value incremental growth was found among 28.0% of the exporting enterprises, stable 19.0%, incremental decline 8.6%, irregular 34.7%, and intermittent 9.6%. The last two categories constituting a flexible approach to export strategy encompass around 45% of the exporting enterprise. The stable and incremental growth categories, which may be represented by incremental growth models, encompass around 47% of the exporting enterprises. For all practical purposes these two groups appear with the same frequency. The remaining exporting enterprises have incrementally declining export quota in the observation period.

Other delimitations of the stable category give different proportions of enterprises in the stable category, but underline the significance of the irregular and intermittent categories.

> *Which are the internal and external factors that characterise the irregular and intermittent exporters?*

Irregular and intermittent exporters are not characterised by certain internal or external factors. They are found among all of the categories that have been included in this study. However, intermittent change patterns are found *more often* among small enterprises than among large. They are also found *less often* among enterprises from Switzerland and Belgium than among enterprises from other countries. There is also an under-representation of enterprises with intermittent change patterns among world-wide exporters.

The widespread dispersion of the change categories among the examined categories of enterprises is a strong indication that the irregular and intermittent change patterns are general features of enterprise development, and not patterns associated with specific sub-groups of enterprises.

> *Specifically, is it so that the smallest firms exploit their flexibility by persisting as irregular or intermittent exporters? If yes, is there a critical enterprise size where it is advantageous to go from intermittent to irregular and subsequently to stable exporting?*

The five-year data panel is not sufficient for drawing any conclusion as to persistence within these categories or transition from one category to another. It is quite clear, however, that the irregular change category is not a small enterprise phenomenon. This change category is found almost equally often in enterprises with 100 to 499 employees as among the smallest enterprises.

The frequency of the intermittent change category decreases uniformly with increasing size of the enterprise. Although this change category is also found in the category of the largest enterprises, it can be regarded as more typical for small than for large enterprises.

> *Are the irregular and intermittent exporters more or less successful by other measures, such as growth in total sales, than the stable exporters?*

Total performance, measured by growth in total sales, is considerably better for intermittent exporters than for other categories, including non-exporters and irregular exporters. The irregular exporters have very similar growth of their total sales as the other non-intermittent categories. It is therefore a mistake to associate intermittence or irregularity in development of export quota as indicators of inferior performance in total sales.

The stable and incremental growth categories, on the other hand, are associated with better performance when the performance measure is the level of export sales quota. The implication of this is that whenever performance objectives are related to specific activities, best performance is found among the enterprises with change patterns that are stable or incrementally growing in these areas.

There is one more issue that should be added to the list of main findings. As part of the statistical analyses clear indications have been found that the enterprises have much more individual approach and higher flexibility than commonly recognised in prevailing theory. These indications are complementary to the identification of the significant role of non-monotonous change patterns, and might be different manifestations of the same phe-

nomenon. The analyses of this study have not been pursued far enough in this direction for more than an indication of the possible existence of the phenomenon.

10.2 Contributions to the academic debate

The starting point of this research effort was outlined as a challenge to the dominating role of incremental growth models as the explanation of changes or development of enterprises. The reported research has given clear empirical support to this challenge: A substantial number of enterprises follow change patterns that can be defined as irregular, and also intermittent, as to the development of their exports, both regarding total export sales and export sales as share of total sales.

Generic properties, such as size category of the enterprise, industry sector, and nationality, all have an influence on the distribution of enterprises among the various change patterns. But the fact remains that the irregular change pattern is found in a significant number of the enterprises from all countries, in all industry sectors, and among all size classes of small and medium sized enterprises. The irregular change pattern is not a singularity which is characteristic for a well defined minority of enterprises; it is a general feature found among all studied categories of enterprises.

The incremental models, therefore, can explain change processes found in a section of the enterprises, but there are also large sections of the business community which develop along very different paths where other explanatory models are required.

In the process of establishing a measurement model it was found that the enterprises had very different perceptions as to which factors were important for their export orientation. There were also clear indications that within each enterprise these perceptions changed over time. Likewise, the causal analyses revealed that very few of the exogenous variables had a consistent relationship to the endogenous variables. The factors contributing to the export orientation process changed over time. Once again evidence was found that the generic variables had some influence on the permanent patterns of relationships, but this did not explain the transient nature of the phenomenon.

The implication drawn from this is that a significant portion of SMEs have individual approaches to addressing their problems and challenges, and they exhibit flexibility in their approaches according to changing circumstances. The context of the decision situation is much wider than what is defined by the variables included in the questionnaire.

Importantly, the data clearly demonstrate that the irregular or intermittent change patterns are not general indications of failure, as discussed above.

The observations suggest two possible, equally interesting, explanations. The first is that the intermittent and irregular change categories are typical for the initial stages of a chain of development or typical for situations with low commitment. This explanation indicates that further research should address the problems of third order change patterns: *What stimulates, or what are the conditions for, transposing the change process from one category of change pattern to another?* This line of questions is very similar to the stages models, but with one important difference: it also includes the mechanisms that prompt transition from one category to another.

The second explanation points to the possibility of *different typologies of SMEs*. One typology derives its competitive position through the well known strategic principles of defining objectives and consistently working towards these in an incremental process. The other typology derives its competitive position through continuous awareness of options, and flexibility and dynamic adaptation to circumstances. The latter typology complies with the models of entrepreneurial behaviour, which could be related to properties of the enterprise or of the manager. According to this explanation, enterprises would maintain the same change pattern over a long period of time.

The present research project had an observation period of five years - the time period it takes for 50 percent of newly started enterprises to cease operation. From a planning point of view, a period that lasts over five years must therefore be treated as permanent in SMEs. The question of whether or not the irregular and intermittent change patterns represent transient or permanent features of SME development (typologies of SMEs), could therefore be regarded as academically interesting, but of low consequence to the practitioner.

10.3 Implications for methodology

The widespread call for longitudinal research, reported in previous studies, has been supported by the present data and analyses, while the call for a multi-variate approach is more ambiguously supported. On the one hand, not very many of the measures consolidated to factors or scales that were stable. On the other hand, previous research and existing theory were not sufficient to identify *a priori* what would be the central measures for the concepts. At the present stage of theory formation a wide selection of measures therefore

ures therefore proved to be of vital importance in order to explore potential relationships and multi-dimensional constructs.

One important conclusion is that longitudinal data and statistical methods for analysing relationships over time are prerequisites for exploring and analysing development processes. Repeated, independent cross-sectional analyses may produce ambiguous and even contradictory results.

Two important issues remain for future research, which have implications for method approach. Firstly, the role of the categories of second order change patterns needs to be addressed, as discussed above. The data required to analyse the possible third order change patterns necessitate more frequent and a larger number of points of observation than the five available to this study. To establish better understanding of the general nature of typologies of enterprises defined by change patterns, survey data of a large number of enterprises are called for.

Secondly, low correlation between the variables have been interpreted as a possible indication of an individualistic and flexible approach to export orientation where the enterprises adapt to perceived actual and prospective circumstances. If this interpretation is correct, the context is of vital importance for the outcome of decisions regarding development of enterprises. The context will always be a complex concept and the very notion of adaptation indicates that the concept cannot be measured by preconceived questionnaires. Therefore, case studies are required to explore the role of the context for the outcome of decisions relating to enterprise development. However, such case studies also need to be repeated in the same enterprises over time in order to observe the same decision system in different contexts. Also this approach presupposes a panel sample.

One other possible explanation for the low correlation coefficients could be that the conceptualisation as well as the applied measures of the concepts are inadequate. Although much modified throughout the project, the modelling for the present study started with previous research as one premise. In this context it is important to remember that previous research has been dominated by cross-sectional data and analyses. This study has clearly confirmed that cross-sectional analyses are inadequate to study phenomena of longitudinal nature. The danger of erroneous conceptualisation is, under such circumstances, immanent. However, once the inadequacy of the initial model was established in Chapter 7, very few modelling constraints were made on the further steps on the process of data reduction. Every precaution has therefore been taken to reduce the effect of modelling misconceptions. The dominating error term is therefore measurement errors at data level.

The analyses have disclosed two seemingly unrelated phenomena: high frequency of irregular and intermittent change patterns; and failure to identify patterns of relationships between independent variables. It is quite conceivable that these two phenomena are independent manifestations of one latent construct: propensity for flexibility and adaptation. The existence of the non-monotonous change patterns can therefore be interpreted as support for the supposition that the low correlation coefficients is a genuine feature, and not the result of inadequate conceptualisation[49].

In earlier empirical studies increasing size of enterprises has frequently been used as a proxy for formalisation, organisational structure, and reduced flexibility. The size parameter did not prove to be a successful discriminant in the attempt to establish a measurement model. At the same time this study has demonstrated that irregular levels of export quotas are found also among enterprises with 100 to 499 employees. Further analyses are required to confirm that a propensity for flexibility is a genuine feature, and to establish adequate measures for this feature.

The apparent lack of structure in the data creates a formidable challenge for the researcher. Mostly, interpretations of results of analyses are based on identification of structural elements in measurements. This was a main issue when attempting to establish a temporally stable measurement model in Chapter 7. The 'text book' interpretation of the analyses would be that no latent variable had been identified, which means that the variables cannot be consolidated as different dimensions of the same construct. As pointed out above, the same results would appear if the enterprises were very individualistic and flexible in their adaptation to external options and challenges. This illustrates that identification of structures between the measures through statistical analyses is not the only possible basis for interpretations. Provided that the modelling, data and analyses are adequate, interpretations can also be made when the statistical analyses depict lack of structure among the measures.

10.4 Implications for policy

The analyses have shown that there are several ways to success for enterprises, very much dependent upon what the enterprises regard as their (present) criterion of success.

[49] Cf. the discussion in section 9.2 of the analyses by Ahokangas (1998) using different subsets of Interstratos data and a different modelling approach.

The intermittent, and to a certain degree also the irregular, change patterns were found to be associated with success measured as growth in total sales. These enterprises may be seen as the players in the markets, searching for new opportunities, and always willing to go for new markets whether they are domestic or foreign. The stable and the incremental growth patterns were found among enterprises that were successful when judged by the criterion of high quotas of export sales or high growth in their quotas of export sales. But these enterprises are very close to the average for all enterprises, when the criterion of growth in total sales is applied. These are the enterprises that follow the path of persistency and gradual development.

It is the feeling of the author that the option and the merits of flexibility and adaptation are not sufficiently presented in management literature and advisory services directed towards SMEs.

Extensive external interaction is important for enterprises which are extending their markets. There is a high correlation between enterprises which are able to extend their markets and managers with long experience and language capabilities. The need for wide external interaction seems to be reduced for enterprises that increase their international commitment through increased quota of export sales. For these enterprises the capability of the manager is no longer so directly related to the measure of their performance. These findings underline the importance of selective instruments for assisting enterprises in their export efforts, all in accordance with their present situation and the actual market objectives of the enterprises.

10.5 Lessons for the academic

The research collaboration in the Interstratos project has in itself been a very valuable lesson in cross-cultural co-operation. Although there were no language problems, and all the researchers were familiar with the field of research, much effort had to be put into forming consensus as to the interpretation of concepts, theoretical approaches, the trivial details of how to handle non-conformities in the data sets, etc. Many of the difficulties could be attributed to small cultural differences and differences in scientific tradition between the members from different countries. These differences were too small to be noticed before they were exposed by, often trivial, problems. In the late stages of the project the group had learned to cope with such problems. It is important for the success of international research co-operation to recognise that problems of this nature will appear and to take this into account in the progress planning.

The strategy for selecting the panel by maintaining the same address lists each year has enabled us to establishing a panel of enterprises that were observed over the total period. However, the yearly data sets can also be used for yearly cross-sectional analyses. In the final observation period the data set describes enterprises capable of surviving at least five years. The data set for the fifth observation is therefore no longer representative for the total population of the selected strata of enterprises, as the data set for the first year was. To maintain a more representative composition of the yearly data sets, the address list should be supplemented each year to compensate for the attrition. Such steps would allow control of the development of the panel enterprises against cross-sections of enterprises that were representative for the total population of enterprises.

In spite of the extensive list of variables, the analyses demonstrated that a few more variables could have greatly improved the basis for interpreting the models. Inclusion of these variables in the Interstratos project was not practical, but should be considered by any follow-up project. First of all, the role of available resources should be analysed. The resource measures included in the Interstratos project were not precise enough to be of use for the present analyses. Secondly, the managers' assessments of previous development of several factors of potential importance for internationalisation have been included in the data set. Expectations concerning future development of the same factors will, however, often be equally important for decisions regarding development of enterprises. Expected future development should be regarded as a significant element of the context of the decision process, and therefore be included in the data set in follow-up research.

Thirdly, the factors *external interaction* and *manager capabilities* have been demonstrated to have a strong influence on the export orientation of SMEs. These two concepts should be further explored by different approaches to consolidation of the available variables. In further research, consideration should be given to find more appropriate and more detailed indicators for these constructs.

10.6 Lessons for the practitioner

The primary objective of this research project has been academically oriented. However, the work has also given some results that are directly relevant for the manager of the SME exporter or would-be exporter.

The most important message is that exporting is a viable market strategy for all types of enterprises. There are examples of successful exporters from all size categories, all industry sectors, and of course all countries.

There are strong indications in the empirical data that the most successful enterprises[50] are highly flexible and adaptive. In our context this means that they switch between export markets and domestic markets. One could say that these enterprises use their flexibility as a basis for their competitive strength.

Extension of exporting has two dimensions: increase in the number of export markets (countries) and increases in the export quota. It has been found that enterprises that increase the number of their export markets tend to have a wide external information network, while enterprises that predominantly increase their export quota tend to focus their information network. This means that the extent and the type of information network are adapted to the type of market extension with regard to two distinct dimensions: growth in geographic extension and growth in sales volume.

10.7 Epilogue

The conclusion of a large research effort invites some reflections, partly on what has been achieved, but also on what could have been achieved if other lines of research had been pursued. Throughout a large research project, choices repeatedly have to be made that are decisive for the further progress of the project. Ideally such choices should be made from theoretical considerations, but equally often problems of a practical nature are, quite prosaically, more vital for the success or failure than theoretical problems. Some of the choices must therefore be steered by practical considerations. In our case this has been the criterion for the choice of participating countries. They represent an interesting section of European countries, but the final selection was decided by which researchers and institutions had an interest, and were able to participate, in the project.

Similarly, a limited selection of industrial sectors are included, and the sample is stratified in five size classes. These choices represent a deliberate research strategy designed to illuminate certain aspects of the research problem at the cost of sacrificing others. There are valid arguments for other options, and no exact measure can be made to weigh the pros and cons for the options.

In this thesis the focus has been on the dynamic properties of the development process. The introduction of the categorical scale of ‘change patterns’ has necessitated special attention to differentials or ratios of the central mea-

[50] Measured by growth in value of total sales.

measures, while the possible effects of absolute levels of the same measures have been neglected. Examples of this are that change ratios of export quotas have been analysed extensively, while the absolute levels of export quota have only been addressed very briefly or indirectly.

In many situations the extent of attention given to a topic is taken as an indication of the attached importance. Such is not the case here. It is very probable that the absolute level of export sales influences the approach to exporting and internationalisation. But the focus has been wide enough as it is, and so some limitations had to be made.

It is clearly acknowledged that the choices made throughout the research process have not been made with the assumption that this researcher, or any researcher, can claim an *a priori* knowledge of what is the best line of research to pursue. But the options which were not pursued have been identified and are there for later revisiting and exploration by the researcher himself or by colleagues.

This research process ends with more questions than it started with, which may seem contradictory to the purpose of research. However, the ability to pose new and better-founded questions is a very good indication that insight has been achieved through a learning process - which is the purpose of research.

POST SCRIPTUM

When I started this work I had a mental picture of the pending task: Writing the thesis would be an intensive intellectual challenge and learning process. The strange thing about learning is that new knowledge blends in with and modifies previous knowledge. It is therefore difficult now to pinpoint actual facts, topics or skills that have been acquired in the process. But I have a definite feeling of accomplishment and intellectual achievement.

For a slightly shorter period of time than I have been involved in the doctoral programme, I have witnessed the first years of my grandson. As all babies he came into this world without a language and without any prior knowledge of his new environment. Four and a half years later I had the experience of talking with him on the telephone, and he was making detailed plans for what we would be doing together during his coming visit.

During the same period we had followed two learning processes. I had been struggling with my theory, model, analysis, etc., which all were extensions of previous knowledge. He had started from scratch, and while seemingly playing he had learned to communicate with a language, learned to use abstract concepts, and learned the abstract skill of planning.

When I compare this intellectual achievement, which is typical for babies, with my own achievements, I become very humble. My greatest intellectual strides are not represented by these pages; they were made during my first years!

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Appendix 1

A.1 The Interatratos project and data set

A.1.1 The Interstratos group

The Interstratos project is a co-operation between researchers in eight European countries. The participants constitute, as individual members, the Interstratos group:

Table A1.1 Participants of the Interstratos group[51]

Austria	J.Hanns Pichler, Erwin Fröhlich, Inge Fröhlich, Peter Voithofer
Belgium	Rik Donckels, Ria Aerts
Switzerland	Hans J. Pleitner, Margrit Habersaat
The Netherlands	Yvonne Prince, Harold Gankema
Great Britain	Graham Hall
Norway	Per-Anders Havnes, Johanne Sletten, Arild Sæther
Sweden	Carin Holmquist, Håkan Boter
Finland	Antti J. Haahti, Allan Lehtimäki†, Petri Ahokangas

The objectives of the Interstratos group are twofold. In a time perspective, the first objective was to establish the international data set over the years 1991 - 1995. The second objective is now being realised in an joint effort of utilising this data set for analytical purposes. In this respect the researchers partly pursue their own research objectives, such as this thesis, partly join in common presentations at international workshops and in joint publications. This part of the co-operation has not yet come into full effect.

The approach is based on the experiences several members of the Interstratos group gained from a similar and previous co-operation on a smaller scale in the Stratos project (Bamberger and Weir, 1990), which was a cross sectional study of strategic orientation of European SME manufacturers.

A.1.2 Data set

The INTERSTRATOS data set has observations of a total of 10815 enterprises over the five year period. For 5770 of the enterprises there is only one

[51] As of January 1998

observation, for 794 enterprises there are five observations, and these 794 enterprises constitute the true panel data set, see Table A1.2.

Table A1.2 The total Interstratos data set

Number of observations	*Number of cases (enterprises)*	*Percentage*	*Cumulative percentage*
1	5770	54	54
2	2183	20	74
3	1162	11	85
4	906	8	93
5	794	7	100
Total	10815	100	

Stratification

The industry sectors used as the basis for stratification have been selected to represent different degrees of maturity of technology and international orientation. The electronic industry represents technology in rapid transition, while, on the other hand, large parts of the textile industry as well as the food and beverages industry sectors are assumed to represent established technologies. At the same time food and beverages industries to a large extent were assumed to be domestically oriented, while electronic industry sector, and to some extent mechanical engineering, were assumed to be more export oriented.

The definition of the industry sectors is made according to two digit NACE codes, valid version 1991, with transformation to applicable national codes, see Table A1.3.

Table A1.3 Definition of industry sectors and corresponding sector categories.

Industry	*NACE Code*[52]		*SSB Code*[53]	
sector	*No*	*Description*	*No*	*Description*
1	43	Production of textiles	321	Production of textiles
	45	Production of footwear and clothing	322	Production of clothing except footwear
			324	Production of footwear
2	34	Electrical engineering (manufacturing of electrical equipment and appliances)	383	Production of electrical appliances and material
3	41	Production of food and drink	31	Production of food, drink and tobacco
	42	Processing of tobacco		
4	46	Manufacture of timber and wooden products, including furniture	33	Production of wooden articles
5	31	Manufacture of metal articles	381	Production of metal articles
	32	Mechanical engineering	382	Production of machines (with exception of office machines)

Composition of data set

The total number of observed cases of the consolidated international data set is presented in Table A1.4. Only enterprises within predefined size categories and where information on the industry sector is given are included in this table. Some of the enterprises have responded to the questionnaire despite having grown beyond the upper size limitation during the period of observation. The data pertaining to these enterprises are included in the data set, and can advantageously be used in some types of analyses related to growth. These cases are not, however, included in Table A1.4.

All descriptive tables related to the total sample in this appendix include observations of British enterprises, over two years, and French enterprises, over one year.

[52] NACE = Nomenclature des Activités Economique, valid version 1991

[53] SSB = Statistisk Sentralbyrå (Norwegian Bureau of Statistics)

Table A1.4 Consolidated international data set. Number of observed enterprises in yearly surveys

	1991		*1992*		*1993*		*1994*		*1995*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Size class										
1-9	1414	31.1	1671	33.0	1311	31.5	906	30.2	921	27.4
10-19	896	19.7	994	19.6	836	20.1	564	18.8	647	19.2
20- 49	1032	22.7	1108	21.9	934	22.4	703	23.4	822	24.4
50- 99	620	13.6	678	13.4	561	13.5	441	14.7	515	15.3
100-499	586	12.9	609	12.0	526	12.6	386	12.9	460	13.7
Total	4548	100.0	5060	100.0	4168	100.0	3000	100.0	3365	100.0
Industry sector										
TEXT	929	20.4	871	17.2	713	17.1	599	20.0	604	17.9
ELEC	683	15.0	744	14.7	644	15.5	421	14.0	506	15.0
FOOD	819	18.0	893	17.6	779	18.7	600	20.0	619	18.4
WOOD	922	20.3	975	19.3	811	19.5	654	21.8	646	19.2
MECH	1195	26.3	1577	31.2	1221	29.3	726	24.2	990	29.4
Total	4548	100.0	5060	100.0	4168	100.0	3000	100.0	3365	100.0

The intention was initially that for each country, the data set should include 20 observations of enterprises for each combination of size class and industry sector, 'cell', totalling 500 observations per country. As can be seen from Table 5.1, Chapter 5, this is only accomplished on a few occasions. However, there are frequent situations with more than 20 observations per cell. In these cases procedures have been adopted in the Interstratos project for a random draw of 20 of the observed enterprises. Such a reduction is not performed in Table A1.4.

For the reasons listed above, the number of observed enterprises reported here may differ marginally from similar figures given by other sources.

Export orientation

As mentioned above, descriptive statistics will not be presented for all variables due to the large number of variables. However, one exception will be made here. Whether or not an enterprise is an exporter is a good indicator of the relevance of the research topic to the enterprises. Table A1.5 therefore depicts the percentage of responding enterprises that were exporters each

year; and also the percentage of multiple responding enterprises that were exporters in one or more of the observations.

Table A1.5 Exporting enterprises in total sample. Number and percentage of observations.

	Exporting enterprise in											
	1991		*1992*		*1993*		*1994*		*1995*		*One of the years*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Yes	2941	68	3146	64	2701	70	2008	72	2312	74	7483	73
No	1389	32	1746	36	1171	30	784	28	808	26	2770	27
Total	4330	100	4892	100	3872	100	2792	100	3120	100	10253	100

The general trend is that the percentage of exporting enterprises increases in the period 1991 - 1995 within the sample. However, no general conclusion should be drawn on the basis of this table, since the survey of 1995 represents 'survivors', that is, enterprises that have the capability of staying in business for more than five years. This is not typical for the total SME community, see discussion in Chapter 9.

A.1.3 Size distribution of enterprises

Although the lower and upper size limitations for the survey have been set to 1 and 499 employees, respectively, there have been a few respondents outside these size limits. Mostly the reason has been that enterprises have grown during the observation period. For some analyses related to growth such information is vital.

For the purpose of the present analyses, inclusion of the enterprises 'outgrowing' the size limits will impair the validity of the analyses. The reasons for this are twofold. Firstly, there are very few respondents growing to more than 499 employees; and also there is a low number of respondents without employees the first year, or retracting to no employee in later years. Due to the low number and lack of control of selection procedures for the respondents beyond the size limits, there would be a high probability of bias in these parts of the data set.

Secondly, there is no procedure for distinguishing between 'no respondent' and enterprises that cease operation, while most of the enterprises exiting at the upper boundaries are survivors. Including the exiting enterprises at the upper size boundary but not at the lower would introduce an asymmetric element to the data set.

To minimise the risk of bias and to secure symmetry, only enterprises with 1 to 499 employees each year are included in the final data set.

See also the discussion on the regression fallacy in section 9.1.4.

A.1.4 Modification of variables

Transforming to national currency[54]

The values of total sales and export sales are given in ECU in the international data set to allow cross-national comparisons. For this thesis these variables have been transformed back to national currencies using the same exchange rates as initially used in the transformation to ECU in the consolidated international data set. For the record, these transformation rates are presented in Table A1.6.

Table A1.6 Applied exchange rates of national currencies to ECU

	1991	*1992*	*1993*	*1994*	*1995*	*Max/Min*
Austria	14.4683	14.4472	14.2033	13.6006	13.5075	1.071
Belgium	42.4789	42.2556	41.5423	40.3579	40.4743	1.053
Finland	4.8697	5.0023	5.7723	6.6824	6.1674	1.372
Great Britain	0.7152	0.7017	0.7333	0.7785	0.7732	1.109
Netherlands	2.3163	2.3133	2.2725	2.1714	2.1525	1.076
Norway	7.9654	8.0285	8.0299	8.2930	8.3524	1.049
Sweden	7.5305	7.4844	7.5003	9.0810	9.1267	1.219
Switzerland	1.7652	1.7741	1.8157	1.7273	1.6173	1.123

Data source: Institut für Gewerbe- und Handwerksforschung, Vienna[55]

[54] This section is included as reference for other users of the Interstratos data set. It has no practical implication for the analyses in this thesis alone.

[55] Telefax dated 08.08.96

Replacing missing value

The coding procedures for one of the variables of main interest, V406 - export sales, have not been clearly defined in the early stages to distinguish between 'zero' and 'missing values'. The value of V406 has been recoded using the dummy variable exporter, EXP, to allow 0 (zero) as a valid value of export sales for identified non-exporters.

Replacing value 0 (zero)

When analysing the temporal change of total sales or export sales, it is of interest to be able to use relative measures also when initial or final values of the variable are 0 (zero). That is not possible with SPSS procedures without excluding cases. To avoid reduction of the available data, and still be able to identify starting or stopping of exporting, these variables have been recoded:

$$V405=0 \Rightarrow V405=0.0000001 \qquad [A1.1]$$

$$V406=0 \Rightarrow V406=0.0000001 \qquad [A1.2]$$

Appendix 2

A.2 Summary of previous research on internationalisation and exporting

Table A2.1 Review articles on exporting and internationalisation

Author(s)/ year(s)	*Dependent variable(s)/ concept(s)*	*Independent variable(s)/ concept(s)*	*Conclusion(s)*	*Reviewed articles*
Aaby and Slater (1989) 1978-88	*Export performance* • Propensity • Export sales • Export problem • Level of export • Perceptions towards export • Export growth intensity • Barriers to export	• Management • Environment • Competencies • Firm characteristics • Strategy	• Size important only when linked to other aspects. • Competencies more important than firm characteristics • Need better performance measures and longitudinal designs	55 studies Review
Andersen (1993) 1977-90	*Internationalisation process* • Uppsala (U) model • Innovation (I) models	• Historical explanations	• Mixed empirical support of U-model • Lack of proper design to explain development process • I-models can not be falsified • Need for longitudinal design	6 studies theory criticism
Bilkey (1978) 1964-77	*Export behaviour models*	• Export orientation • Motivation for export • Obstacles to exporting • Management • Firm size • Export destination • Export risk • Export models • Export profiles	• Export is a developmental process • Equation coefficients differ between stages • Export profiles can be formulated	43 studies Review

Table A2.1 Review articles on exporting and internationalisation /Cont.

Author(s)/ year(s)	*Dependent variable(s)/ concept(s)*	*Independent variable(s)/ concept(s)*	*Conclusion(s)*	*Reviewed articles*
Buckley (1991) 1968 →	*N.a.*	N.a.	• New agenda for social science research	Thematic review
Dichtel *et al.* (1984) 1964-81	*Export entry decision*	Motive lists Profiles of exporting firms Export decision models • Stages models • Importance of history of firm	Existing export-related research is too fragmentary. Number of persons or of hierarchical levels involved in decision process proxy for size. Concept confusion due to inadequate operationalisation.	Review
Gemünden (1991) 1962-86	*Export success* • *Export share* • *Export growth* • *Export profitability*	Success factors • Size • Export orientation • Intensity of R&D • Product adaptation	• Little support for size factor • R&D positively related to intensity but not to growth • Information activity positively related	49 studies Meta-analytic critique
Leonidou (1995a) 1970-95	*Export* • *prosperity* • *engagement* • Initiate, develop or sustain export	• Export stimuli • Decision maker • Organisational characteristics • Environmental characteristics • Fortuitous orders	• Bulk of current research still at identification and conceptualisation stages. • Incomplete conceptually, ignored previous work. • Descriptive, exploratory and ad hoc.	27 studies Review

Table A2.1 Review articles on exporting and internationalisation /Cont.

Author(s)/ year(s)	*Dependent variable(s)/ concept(s)*	*Independent variable(s)/ concept(s)*	*Conclusion(s)*	*Reviewed articles*
Leonidou (1995b) 1960 →	*Export barriers* • *Latent* • *Operational* • *Frequency* • *Intensity/importance*	• Stage of internationalisation • Internal/external • Domestic/foreign • Period of field work	• Cross-sectional research • Ethnocentric orientation • Strongest barrier: lack of information on foreign markets, then documentation procedures, and findings representation. • Insufficient conceptualisat. • Ignoring previous results • More cross-cultural studies.	35 studies Review, assessment and synthesis
Leonidou and Katsikeas (1996) 1975-92	*Export development process* • *Exporting phase* • *All stages models*	• Manufacturing firms • Managerial determinants. • Organisational characteristics. • Export stimuli and inhibitants.	• Three broad phases identified • pre-engagement phase • initial phase • advanced phase • Stages insufficiently defined. • Variables arbitrarily chosen. • All models are incremental, and almost all static in nature. • Surveys at one point in time.	10 studies Review and synthesis
Li and Cavusgil (1995) 1969	*International marketing research streams* • *Internationalisation process one of these streams*	• Conceptual and empirical research streams on internationalisation process	• International marketing → attitudinal and behavioural change. • Occurrence in stages • Incremental model not supported • Two processes: one sequential and one random	10 studies on internationalisation process Classification and assessment

Table A2.1 Review articles on exporting and internationalisation. /Cont.

Author(s)/ year(s)	*Dependent variable(s)/concept (s)*	*Independent variable(s)/ concept(s)*	*Conclusion(s)*	*Reviewed articles*
Miesenbock (1988)	*Exporting*	• Decision maker • Stage of internationalisation • Product • Country • Stimuli • Demographic characteristics • Managerial charact. • Marketing • R&D • Finance	• Exporting is a sequential process. • Decision maker most important single variable • Determining variables depend on stage • Impossible to identify influencing variables	Review article
Reid (1981)	*Export entry and expansion process*	• Impact of decision-maker on behaviour. • Innovation-adoption process. • Foreign market orientation. • Stimuli influenced by manager characteristics.	• Domination of one-shot, cross-sectional studies, and correlation analyses. • Distinction between foreign entry expansion in small and large firms. • Five stage model.	Review and conceptual model
Thomas and Araujo (1985) 1968-84	*Export behaviour* • *Initiation*	• Innovation model • Knowledge development • Internal and external stimuli • Active, passive and domestic firms • Stage hierarchy	• Innovation adaptation behaviour • Stages decided by interaction between firm and entrepren characterist. • Most studies lack solid empirical base since they are cross-sectional.	9 studies Review and analysis
Thomas and Araujo (1986)	*Export behaviour* • *Innovative strategy* • *Knowledge development* • *Pre-export behaviour* • *Stage hierarchy*	• Firm and decision maker characteristics. • Innovation adoption process - information essential	• Insufficient empirical basis • Implicit assumption of positive value of exporting • Adaptation to environmental conditions	Review

Table A2.2 Publications of empirical research on internationalisation and exporting

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Ali and Swiercz	1991	Manager attitudes Experience Enterprise size	Multivariate relationships Stages [0] Size [-]	Total sales, US$ Sml <5 mill Med < 50 mill Lrg > 50 mill	Not defined	S=500 N=195	C	USA (Mid West)
Bell, Murray, and Madden	1992	Change in export performance Export training programme	Simple tabulations Program evaluation Stages [0] Size [0]	<50 to <200 employees	Several industry sectors	S=38 N=26	C	Northern Ireland
Bilkey	1982	Profitability of exporting - relative (ordinal) Export marketing channels Export methods Foreign dealer support	Multiple regression Partial correlation Exploratory Stages [0] Size [0]	≥ 50 employees	Manufacturing	S=697 N=168	C	USA (Wisconsin)

Cont./

Legend

Stages [0] = no testing of dynamic model
Stages [-] = stages model rejected
Stages [+] = stages model supported

Size [0] = size parameter not included
Size [-] = no relation between size and dependent variable
Size [+] = significant relation between size and dependent variable

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Bonnaccorsi	1992	*Export intensity* *Export propensity* Size Domestic market coverage	Analysis of variance (ANOVA) Correlation Repeated cross-sectional Stages [0] Size [-]	Vsmall: 11-20 Population: all firms ≥ 11 employees	All sectors	n.a.	L Secondary data, public statistics	Italy
Burton and Schlegelmilch	1987	*Exporters versus non-exporters* *- export involvement relative to industry average* Firm classification and policies Marketing policies Managerial attitudes Self-perception of management	Multiple discriminant analyses Profile analysis Stages [0] Size [+]	n.a.	Mechanical engineering and food processing	S=1500 N=510	C	United Kingdom and West Germany
Calof	1993	*Exporting* *- export intensity (% tot. sales)* *- markets served* Firm size	Cross tabulation Archive data + case + survey Stages [0] Size [+]	Total sales, C$ 10 - 250 mill SME < 50mC$	Manufacturing	N=38	n.a.	Canada (Ontario)

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Calof and Beamish	1995	*Internationalisation (process)* *- mode change (institutional arrangements)* Changes in constraints Changes in markets Mode costs and benefits	Cross-tabulation Descriptive statistics Stages [+] Size [0]	Total sales, C$ 25-200 mill SME < 50mC$	Not defined	S=47 N=38	Retrospective interview	Canada
Cavusgil and Naor	1987	*Export activity* *- exporter/non-exporter* Unique firm advantage Decision-maker characteristics Resource Commitment to exp. Perceived attractiveness of exp. Company size	Discriminant analysis Stages [0] Size [+]	< 1000 employees, non affiliated, autonomous	Manufacturing	S=795	C	USA (Maine)
Cavusgil and Nevin	1981	*Export marketing behaviour* *- exporter/non-exporter* Differential advantages Managerial aspirations Commitment to export marketing	Automated interaction detector Stages [0] Size [+]	<25 to >250 employees	Manufacturing	S=816 N=473	C	USA (Wisconsin)

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Craig	1993	*Export performance* *- export profitability* *- export intensity (% tot. sale)* *- export growth* Motivation Commitment Market/market activities Product	Correlation Stages [0] Size [0]	≤ 100 employees	Manufacturing Distribution Service	S≅235 N=89	C	England
Christensen and Jacobsen	1996	*Early export start-up* *- exporter/non exporter* *- export rates* Age Entrepreneur experience Networks	Longitudinal and cross-sectional descriptive statistics Stages [+] Size [0]	Total population	Total population	N=948	L Secondary, census data	Denmark
Culpan	1989	*Export performance* *- export ratio* *- growth in export ratio* *- no. of export transactions* *- no. of foreign markets* Effect of size Product type Target market Export related assistance	Discriminant analysis Stages [0] Size [+]	Small < 100 employees Medium ≥ 100 employees	Manufacturing	S=600 N=210	C	USA (Pennsylvania)

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Dwyer	1992	*Export orientation* *- export intensity (% tot. sales)* Corporate goal structure Export strategies Planning	Cross-tabulations Stages [0] Size [+]	< 230 employees Small ≤ 20 employees Large > 20 employees	Wine manufacturers	N=30	C	Australia
Gankema, Snuif, and van Dijken	1996	*Evaluation of stages theory* *- export/sales ratio* *- four stages/categories*	Del analysis Repeated cross-sectional analysis Stages [+] Size [0]	< 500 employees	5 manufacturing industries	N=144	L 5 observations	Austria, Belgium, Finland, Norway, Sweden, Switzerland
Gomez-Mejia	1988	*Human resource strategy and export performance* *- changes in export share* *- changes in export intensity* *- changes in export intensity relative to industry* Differential firm advantage Managerial perceptions Marketing activities Human resource strategy	Stepwise multiple regression Life cycle stage Stages [0] Size [-]	n.a.	Manufacturing	N=388	L 2 observations	USA (Florida)

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Holzmüller and Kasper	1990	*Exporter/Non-exporter* Decision maker's role Manager's foreign orientation - education - risk aversion Psychic distance	Profile analysis Discriminant analysis Stages [0] Size [0]	50 - 1000 employees	Manufacturers	S=110 N=103	C	Austria
Holzmüller and Kasper	1991	*Export performance:* - *export ratio* - *change in export ratio* Decision maker's role and characteristics. Characteristics of - enterprise - environment	Organisational culture Regression analysis Factor analysis Stages [0] Size [-]	50 - 1000 employees	Private sector, mainly manufacturing	S=110 N=103	C	Austria
Johnston and Czinkota	1986	*Export attitudes and behaviour* Managerial attitudes to exports Export product offering Manuf. orientation in exporting Obtaining first export order	Descriptive statistics Stages [0] Size [0]	Sales volume <US$50 mill	Manufacturing 3 high tech industries	S=1019 N=200	C	USA

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Kaynak, Ghauri and Olofsson-Bredenlöw	1987	*Export orientation* Degree of internationalisation	Descriptive statistics Stages [0] Size [0]	Small 5-49 Medium 50-200 employees	Not specified, mostly manufacturing	S=115 N=86	C	Sweden
Kaynak and Kang-yen Kuan	1993	*Export performance (high/low)* *- export sales* *- export profitability* *- % of total sales from export* *- % of total profits from export* Export operating environment Export marketing strategy Export operating unit structure	Stepwise discriminant analysis Stages [0] Size [+]	<100 to >2300 employees	Manufacturing, 5 industries Min 3 years exporting experience	S=1228 N=154	C	Taiwan

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Louter, Ouwerkerk and Bakker	1991	*Identify export success factors* - *self assessment* - *export/sales ratio* - *export profitability* Company factors Strategy factors Attitude factors	Descriptive cross tabulations LISREL Stages [0] Size [-]	<100 employees	Exporters	S=334 N=165	C	Netherlands
Mancini and Prince	1993	*Export success:* - *export ratio* Firm size Other international activities Export strategy Manager characteristics Information sources Local markets Home country	Factor analysis Regression analysis Stages [0] Size [-]	< 500 employees	5 manufacturing industry sectors	N=452	C	Belgium Netherlands Norway Sweden Finland
McNaughton	1992	*Export performance and market characteristics* - *export ratio* Product Experience	Analysis of tables (ANOTA) model Stages [+] Size [-]	Small: Revenue ≤C$100,000	Manufacturing	S=442 N=75	C	Canada

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Paasche and Solem	1992	*Export success:* - *Export rate* - *Exporter/Non-exporter* Median growth in total sale Experience /know-how Management strategies	Simple cross tabulations Stages [0] Size [+]	< 200 employees	Manufacturing	S=200 N=166	C	Norway
Piercy	1981	*Internationalisation:* - *reactive/active exporter* Export market strategy	Case + survey Stages [0] Size [+]	100 - 2000 employees	Manufacturing 4 industry sectors	S=250 N=125	C	England
Piercy	1983	*Export market strategy decision* Active/reactive	Exploratory Descriptive statistics Stages [0] Size [0]	≥100 to ≤500 employees	Manufacturing	S=519 N=250	C	England

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Prince	1995	*Export performance* *- exporter/non-exporter* *- export quota*	Discriminant analysis Regression analysis Stages [0] Size [+/-]	< 500 employees	5 manufacturing industries	N=380 N=816	C	Austria, Belgium, Finland, United Kingdom, Netherlands, Norway, Sweden, Switzerland
Rao and Naidu	1992	*Stages of internationalisation* *- non-exporters* *- export intenders* *- sporadic exporters* *- regular exporters* Size Total sales Domestic sales Perceived competition Export orientation	Cross tabulation Discriminant analysis Stages [+] Size [+]	< 300 full-time employees	Not specified	S=2300 N=777	C	USA (Wisconsin)

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Reid	1984	'*Intention' to start exporting* Information sources Information acquisition	Regression Correlation Stages [0] Size [0]	Unidivisional 100 - 500 employees	Metal fabrication Furniture manuf. Machine manuf.	S=89 N=45	C	Canada
Samuels, Greenfield, and Mpuku	1992	*Pricing behaviour* Attitude towards risk Firm size % of sales exported	Explorative Cross tabulations Stages [0] Size [+]	Vsml < 25 Med ≤ 200 Lge < 200 employees	Diverse industries	S≅210 N=70	C	England (West Midlands)
Schlegelmilch	1986a	*Export behaviour* *- non-exporter* *- exporter* *-high-exporter (vs. industry average)* Industry specific factors Country specific factors	Discriminant analysis Stages [0] Size [0]	n.a.	Mechanical engineering and food processing	S=1500 N=510	C	United Kingdom and West Germany
Schlegelmilch	1986b	*Export performance* *- not defined or measured* Attitudinal variables	Bivariate + Multivariate + Discriminant analyses Descriptive Stages [0] Size [0]	n.a.	Mechanical engineering	S=1000 N=210	C	United Kingdom and West Germany

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Schlegel-milch and Crook	1989	*Export intensity (ratio)* Management expecta-tions and perceptions Market variables Differential advantages and resources of the firm Firm demographics	Predictive model Empirically tested Multiple regression analysis Stages [0] Size [+]	Sample include from <20 to >1000 employees	Mechanical engineering	S=500 N=105	C	United Kingdom
Sharma	1991	*Export performance* *export share of total sales* *number of exp. markets* Employment change Compensation strategies Firm size	Regression analysis Stages [0] Size [+]	< 100 employees	Manufacturing	S=201 N=14	C	Canada
Sriram and Sapienza	1991	*Export involvement* *- export intensity (% tot. sale)* Marketing Product adaptation Distribution Number of countries	MANOVA and t-tests Discriminant analy-sis Stages [0] Size [+]	Sml ≤ 250 Lge > 250 em-ployees.	Not defined	S=671 N=121	C	USA

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Sullivan and Bauerschmidt	1990	*Scope of internationalization* *- geographic dispersion of sales and production operations* Psychic distance Perceived market information Barriers and incentives	Factor analysis Stages [-] Size [0]	Not defined	Forest products	S=420 N=62	C	Austria, Finland, Sweden, West Germany
Ursic and Czinkota	1984	*Export* *- attitudes* *- behaviour* *Export intensity (% of tot. sale)* Age of firm	Experience curve explanation t-tests Stages [0] Size [0]	Tot. sale < $50 mill. Young < 20 Old ≥ 20 in business	3 manufacturing industries	S=980 N=182	C	USA
Walters and Samiee	1990	*Export performance* *- export profit margins after tax* *- growth in export sales* *- export proportion of sales* Export commitment Export strategy Export management Contextual factors	Strategy; causal model. Success factors Factor analysis Regression analysis T-tests Chi-square tests Stages [0] Size [0]	Small: 1-99 Large: > 100 employees	8 manufacturing industries Exporters	S=504 N=145	C	USA

Table A2.2 Publications of empirical research on internationalisation and exporting /Cont.

Author(s)	*Publ. Year*	*Concepts / Measures*	*Approach / Research model*	*Size / size criteria*	*Industry sector(s)*	*Sample (S) Respond (N)*	*Longitud (L) Cross sect (C)*	*Country*
Westhead	1995	*Exporter/Non-exporter* *Employment growth* Firm age Industry sectors Managerial characteristics Industrial network Competition	Matched pairs comparison, exporter/non-exporter Stages [0] Size [+]	1 to 4 years since first order	Manufacturing and producer services	S=4914 N=267	C	United Kingdom

Legend

Stages [0] = no dynamic model
Stages [-] = stages model (claimed) rejected
Stages [+] = stages model (claimed) supported

Size [0] = size parameter not included
Size [-] = no relation between size and dependent variable
Size [+] = significant relation between size and dependent variable

Appendix 3

A.3 Variables used to measure concepts

The concepts of the measuring model are defined and discussed in Chapter 4. The variables used to measure these concepts are listed in the tables below:

Table A3.1 Personal characteristics of entrepreneur (EN_i)

Code	*Variable definition*	*Scale*
V901	Age when full-time education completed.	R/I
V902	Years of experience in industry sector.	R/I
V903	Number of weeks abroad over past three years.	R/I
V904	Number of languages commanded by manager group (including mother tongue).	R/I
V905	Governments should not restrict the free market, not even by use of incentives.	O/1-5
V906	Professional bodies and similar organisations should provide assistance only to their members.	
V907	Changes in enterprises should be avoided at all costs.	O/1-5
V908	An enterprise should not leave the region where it was first established.	O/1-5
V909	Jobs should be clearly described and defined in detail.	O/1-5
V910	Managers should plan instead of following their intuition.	O/1-5
V911	Enterprises should use only well established administrative routines and production techniques.	O/1-5
V912	In family firms management should stay in the family.	O/1-5
V913	Small firms should not hesitate to engage in business with large firms.	O/1-5
V914	Managers of small enterprises should take personal responsibility for recruitment of employees.	O/1-5
V915	Managers should consider ethical principles in their conduct of business.	O/1-5
V916	Business should take precedence over family life.	O/1-5

Legend: R/I = Ratio scale, integer

O/1-5 = Ordinal scale, 5 points: 1=strongly disagree, 2=disagree, 3=no opinion, 4=agree, 5=strongly agree

Table A3.2 Characteristics of enterprise (EN_i) - General

Code	*Variable definition*	*Scale*
V101	Country	N
V102	Enterprise number	Ident.no.
V103	Industry sector	N/5
V110	Is the firm a subsidiary?	D
V111	Number of full-time employees	R/I
V112	Number of part-time employees	R/I
V113	Number of apprentices	R/I
EMP	Number of employees, EMP = V111+ 0,5V112 + 0,4V113	R/D,1
SC	Size class, employment	O/5
V126	Is the enterprise a sub supplier to other enterprises?	D
V127	Is the enterprise a family business (family control > 50% of equity)?	D

Legend:

O/5 =	Ordinal scale, 5 categories 1=1-9; 2=10-19; 3=20-49; 4=50-99; 5=100-499
R/I =	Ratio scale, integer
R/D,n=	Ratio scale, n decimal(s)
D =	Dichotomous scale, 0=missing, 1=yes, 2=no
N=	Nominal scale, no limit to categories defined

Table A3.3 Variables used to measure enterprise specialisation

Code	*Description*	*Scale*
Manufacturing specialisation (MFG)		
V116	Individual production?	D
V117	Batch (small series) production?	D
V118	Long series production?	D
Product specialisation (PRD)		
V119	Final products to stock?	D
V120	Final products to order?	D
V121	Components to stock and final products to order?	D
V401	Number of product groups?	R/I
V402	Percentage of sales within three most important product groups?	R/I
Market specialisation (MRK)		
V122	Are customer requirements very differentiated your industry sector?	D
V123	Are customer requirements very similar in your industry sector?	D
V403	Number of customer groups for the enterprise?	R/I
V404	Percentage of sales to the three most important customer groups?	R/I
Legend:	D = Dichotomous scale, 0=missing, 1=yes, 2=no	
	R/I = Ratio scale, integer	

Table A3.4 Export stimuli (ST_i)

		Presumed		
Code	*Variable definition*	*Internal*	*External*	*Scale*
V786	Workers' skill (domestic)	x		N/3
V787	Technology (domestic)	x		N/3
V788	Price levels (domestic)	x		N/3
V789	Cost levels (domestic)	x		N/3
V790	Customer relations		x	N/3
V791	Supplier relations		x	N/3
V792	Larger markets		x	N/3
V793	Full use of capacity (domestic)	x		N/3
V794	Spreading risks		x	N/3
V795	Subsidies (domestic)		x	N/3
V796	Tax on profits (domestic)		x	N/3
V797	Supply of raw materials		x	N/3
V798	Political stability (domestic)		x	N/3
V799	Favourable entrepreneurial climate (domestic)		x	N/3
V800	Product range	x		N/3
V801	Export know-how	x		N/3
V802	Finance	x	x	N/3
V803	Frontier formalities		x	N/3
V804	Prestige	x		N/3
V805	Growth	x		N/3
V806	Acquisition of information (domestic)		x	N/3
V807	Following the market leader		x	N/3

Legend N/3 = Nominal scale,
3 categories, 1 = in favour, 2 = no significance, 3 = in disfavour

Table A3.5 Export orientation (EO_i)

Code	*Variable definition*	*Scale*
V405	Total sales (Mio ECU)	R/D,3
c405	Total sales, computed (Mio national currency)	R/D,3
V406	Export sales (Mio ECU)	R/D,3
c406	Export sales, computed (Mio national currency	R/D,3
EXP	Exporter? (Assessed variable)	D
EXPR	Export ratio EXPR = V406/V405	R/D,2
V714	Export markets, countries	N
V716	Most important export market, country	N
REG	Export regularity, assessed	N/5

Legend:		
	N/5 =	Nominal scale, 5 categories
	N=	Nominal scale, no limit to categories defined
	R/I =	Ratio scale, integer
	R/D,n=	Ratio scale, n decimal(s)
	D =	Dichotomous scale, 0=missing, 1=yes, 2=no

Table A3.6 External interaction (IN_i) - Distribution

Code	*Variable definition*	*Scale*
V705	Did the enterprise during the previous year export through domestic agent?	D
V706	Was the enterprise during the previous year a sub supplier to an exporting manufacturer?	D
V707	Did the enterprise during the previous year sell to a domestic exporting distributor?	D
V708	Did the enterprise during the previous year sell through a foreign agent?	D
V709	Did the enterprise during the previous year sell directly to foreign customers?	D
V710	Did the enterprise during the previous year licence products to foreign manufacturers?	D
V711	Had the enterprise during the previous year a foreign daughter company for distribution?	D
V712	Had the enterprise during the previous year a foreign daughter company for manufacturing?	D

Legend:		
	D =	Dichotomous scale, 0=missing, 1=yes, 2=no

Table A3.7 External interaction (IN_i) - Information exchange

Code	*Variable definition*	*Scale*
V339	Did the enterprise during the previous year use domestic external information and advisory services on internationalisation?	D
V340	Did the enterprise during the previous year use foreign external information and advisory services on internationalisation?	D
If yes, please indicate which of these domestic services has been used:		
V301	Further training institutions?	M
V302	Consultants (business/taxation/accounting/legal/etc.)?	M
V303	Credit agencies?	M
V304	Suppliers?	M
V305	Customers?	M
V306	Export clubs?	M
V307	Chamber of commerce?	M
V308	Research institutions?	M
V309	Public export promotion agencies?	M
V310	National trade fairs?	M
V311	International trade fairs?	M
V312	International organisations?	M
If yes, please indicate which of these domestic services has been used:		
V313	Further training institutions?	M
V314	Consultants (business/taxation/accounting/legal/etc.)?	M
V315	Credit agencies?	M
V316	Suppliers	M
V317	Customers?	M
V318	Export clubs?	M
V319	Chamber of commerce?	M
V320	Research institutions?	M
V321	Public export promotion agencies?	M
V322	National trade fairs?	M
V323	International trade fairs?	M
V324	International organisations?	M
V702	Did the enterprise purchase raw materials directly from a foreign supplier?	D

Legend: D = Dichotomous scale, 0=missing, 1=yes, 2=no
M = Multiple response, 0 = missing/no, 1 = yes

Table A3.8 External interaction (INi) - Co-operation

Code	*Variable definition*	*Scale*
V808	Did the enterprise co-operate with domestic enterprises during the previous year?	D
V809	Did the enterprise co-operate with foreign enterprises during the previous year?	D
V810	Did the enterprise co-operate domestically during the previous year?	D
V811	Did the enterprise co-operate abroad during the previous year?	D
If the enterprise did co-operate, did it take place domestically with a domestic partner regarding:		
V717	Extension of product spectrum	M
V718	Research and development	M
V719	Financing	M
V720	Sales	M
V721	Market research	M
V722	After-sales service	M
V724	Advertising and promotion	M
V724	Purchasing and supply	M
V725	Transporting and warehousing	M
V726	Manufacturing	M
V727	Administration	M
V728	Electronic data processing	M
If the enterprise did co-operate, did it take place domestically with a foreign partner regarding:		
V729	Extension of product spectrum	M
V730	Research and development	M
V731	Financing	M
V732	Sales	M
V733	Market research	M
V734	After-sales service	M
V735	Advertising and promotion	M
V736	Purchasing and supply	M
V737	Transporting and warehousing	M
V738	Manufacturing	M
V739	Administration	M
V740	Electronic data processing	M

Cont./

/Cont.

If the enterprise did co-operate, did it take place abroad with a domestic partner regarding:

V741	Extension of product spectrum	M
V742	Research and development	M
V743	Financing	M
V744	Sales	M
V745	Market research	M
V746	After-sales service	M
V747	Advertising and promotion	M
V748	Purchasing and supply	M
V749	Transporting and warehousing	M
V750	Manufacturing	M
V751	Administration	M
V752	Electronic data processing	M

If the enterprise did co-operate, did it take place abroad with a foreign partner regarding:

V753	Extension of product spectrum	M
V754	Research and development	M
V755	Financing	M
V756	Sales	M
V757	Market research	M
V758	After-sales service	M
V759	Advertising and promotion	M
V760	Purchasing and supply	M
V761	Transporting and warehousing	M
V762	Manufacturing	M
V763	Administration	M
V764	Electronic data processing	M

Legend: D = Dichotomous scale, 0=missing, 1=yes, 2=no

M = Multiple response, 0 = missing/no, 1 = yes

Appendix 4

A.4 Analysis of export regularity

A.4.1 Stable enterprises

For enterprises with stable change patterns there will not be any trend in changes over time, only random fluctuations around a constant mean value. These fluctuations can therefore be regarded as independent over time, in which case they can be treated statistically as independent random terms. If the observation period is one year, the expected difference from the mean value can be expressed as:

1 year period: $\delta_1 = s$

If the observation period is two or more years, the expected difference will similarly be:

2 year period: $\delta_2 = \sqrt{s^2 + s^2} = s\sqrt{2}$

and the general term for a n year period:

n year period: $\delta_n = s\sqrt{n}$

where:

n = number of years

s = expected deviation from mean value over one year

There is no given or correct definition of what constitutes stability in the development of an enterprise. It is clearly unreasonable to assume that there will be no random fluctuation, but if this fluctuation is large, we have irregularities, not random fluctuation. Between these obscure limits we will find the band within which fluctuations are so small that they may be regarded as variances in a stable situation for the enterprise.

Since there is no *a priori* definition of the area of stability, three different values of *s* will be tested on the Interstratos data set. The corresponding factors delimiting upper limit, f_u, and lower limit, f_l , for the band of stable developing enterprises, are calculated as described above: $f_l = 1 - \delta_n$, $f_u = 1 + \delta_n$.

Table A4.1 Upper and lower limiting factors for fluctuations in stable enterprises

Yearly	*Number of years per period, n*							
fluctuations,	*1*		*2*		*3*		*4*	
s	f_l	f_u	f_l	f_u	f_l	f_u	f_l	f_u
.10	900	1.100	.859	1.141	.827	1.173	.800	1.200
.20	.800	1.200	.717	1.283	.654	1.346	.600	1.400
.30	.700	1.300	.576	1.424	.480	1.520	.400	1.600

A.4.2 Export quotas

Table A4.2 Frst order change patterns of export quotas, two observations. Non-exporters excluded. Distribution of enterprises, percent

	1991 -				*1992 -*			*1993 -*		*1994-*
	92	*93*	*94*	*95*	*93*	*94*	*95*	*94*	*95*	*95*
s=0.1										
Stop	3	2	4	6	3	3	3	2	3	2
Decrease	23	27	24	21	28	21	18	27	23	27
Stable	33	34	30	29	31	33	31	31	33	34
Increase	35	35	36	37	34	40	41	36	35	35
Start	6	2	6	7	4	4	7	4	6	2
Sum	100	100	100	100	100	100	100	100	100	100
s=0.2										
Stop	3	7	4	6	3	3	3	2	3	2
Decrease	20	18	16	12	18	15	12	19	14	18
Stable	47	42	48	46	48	47	46	48	50	50
Increase	28	27	27	29	27	31	32	27	27	28
Start	2	6	6	7	4	4	7	4	6	2
Sum	100	100	100	100	100	100	100	100	100	100
s=0.3										
Stop	3	7	4	6	3	3	3	2	3	2
Decrease	16	12	10	9	13	9	7	15	11	14
Stable	56	53	59	55	59	58	55	57	57	59
Increase	23	22	21	23	21	26	28	22	23	23
Start	2	6	6	7	4	4	7	4	6	2
Sum	100	100	100	100	100	100	100	100	100	100
N	630	559	487	481	560	500	474	610	697	646

Table A4.3 Second order change patterns of export quotas and nationality of enterprises

		Change pattern export quotas					*Row*
		Incr. growth	*Stable*	*Incr. - decline*	*Irregular*	*Inte-mittent*	*Total*
Nationality							
Austria	*N*	10	16	7	13	7	53
	Exp.	14.8	10.1	4.6	18.4	5.1	12.8 %
	Row pct.	18.9 %	30.2 %	13.2 %	24.5 %	13.2 %	
Belgium	*N*	5	13	1	13	1	33
	Exp.	9.2	6.3	2.9	11.5	3.2	8.0 %
	Row pct.	15.2 %	39.4 %	3.0 %	39.4 %	3.0 %	
The Netherlands	*N*	2	0	0	2	4	8
	Exp.	2.2	1.5	0.7	2.8	0.8	1.9 %
	Row pct.	25.0 %	0.0 %	0.0 %	25.0 %	50.0 %	
Switzerland	*N*	21	7	3	14	1	46
	Exp.	12.9	8.8	4	16	4.4	11.1 %
	Row pct.	45.7 %	15.2 %	6.5 %	30.4 %	2.2 %	
Norway	*N*	12	12	5	21	3	53
	Exp.	14.8	10.1	4.6	18.4	5.1	12.8 %
	Row pct.	22.6 %	22.6 %	9.4 %	39.6 %	5.7 %	
Sweden	*N*	55	27	16	63	20	181
	Exp.	50.6	34.5	15.7	62.8	17.4	43.6 %
	Row pct.	30.4 %	14.9 %	8.8 %	34.8 %	11.0 %	
Finland	*N*	11	4	4	18	4	41
	Exp.	11.5	7.8	3.6	14.2	4	9.9 %
	Row pct.	26.8 %	9.8 %	9.8 %	43.9 %	9.8 %	
Column	*N*	116	79	36	144	40	415
Total	*Row pct.*	28.0 %	19.0 %	8.7 %	34.7 %	9.6 %	100.0 %

Chi-Square	***Value***	***DF***	***Significance***
Pearson	52.71297	24	0.00063
Likelihood Ratio	48.4218	24	0.00224
Mantel-Haenszel test for linear association	0.04187	1	0.83787
Minimum Expected Frequency -	0.694		
Cells with Expected Frequency < 5 -	13 OF 35 (37.1%)		
Number of Missing Observations:	0		

Table A4.4 Second order change patterns of export quotas and industry sector of enterprises

		Change pattern export quotas					*Row*
		Incr. growth	*Stable*	*Incr. - decline*	*Irregular*	*Inte-rmittent*	*Total*
Industry sector							
TEXT	*N*	20	14	7	23	8	72
	Exp.	19.1	13.3	7	24.9	7.6	20.1 %
	Row pct.	27.8 %	19.4 %	9.7 %	31.9 %	11.1 %	
ELEC	*N*	22	16	9	24	4	75
	Exp.	19.9	13.8	7.3	26	8	20.9 %
	Row pct.	29.3 %	21.3 %	12.0 %	32.0 %	5.3 %	
FOOD	*N*	2	5	2	13	2	24
	Exp.	6.4	4.4	2.3	8.3	2.5	6.7 %
	Row pct.	8.3 %	20.8 %	8.3 %	54.2 %	8.3 %	
WOOD	*N*	20	9	7	28	16	80
	Exp.	21.2	14.7	7.8	27.7	8.5	22.3 %
	Row pct.	25.0 %	11.3 %	8.8 %	35.0 %	20.0 %	
MECH	*N*	31	22	10	36	8	107
	Exp.	28.4	19.7	10.5	37.1	11.4	29.9 %
	Row pct.	29.0 %	20.6 %	9.3 %	33.6 %	7.5 %	
Column	*N*	95	66	35	124	38	358
TotalRow pct		26.5 %	18.4 %	9.8 %	34.6 %	10.6 %	100.0 %

Chi-Square	***Value***	***DF***	***Significance***
Pearson	19.78026	16	0.23028
Likelihood Ratio	19.99401	16	0.22049
Mantel-Haenszel test for linear association	0.16384	1	0.68565

Minimum Expected Frequency:	2.346
Cells with Expected Frequency < 5:	3 of 25 (12.0%)
Number of Missing Observations:	57

Table A4.5 Second order change patterns of export quotas and size class 1991 of enterprises

		Change pattern export quotas					*Row*
		Incr. growth	*Stable*	*Incr. decline*	*Irregular*	*Intermittent*	*Total*
Size class. Employees							
1-9	*N*	5	2	4	11	8	30
	Exp.	7.7	5.3	2.9	10.8	3.3	8.6 %
	Row pct.	16.7 %	6.7 %	13.3 %	36.7 %	26.7 %	
10-19	*N*	14	6	9	23	12	64
	Exp.	16.4	11.3	6.3	23.1	7	18.4 %
	Row pct.	21.9 %	9.4 %	14.1 %	35.9 %	18.8 %	
20-49	*N*	19	17	9	38	10	93
	Exp.	23.9	16.3	9.1	33.5	10.2	26.8 %
	Row pct.	20.4 %	18.3 %	9.7 %	40.9 %	10.8 %	
50- 99	*N*	38	15	5	32	5	95
	Exp.	24.4	16.7	9.3	34.2	10.4	27.4 %
	Row pct.	40.0 %	15.8 %	5.3 %	33.7 %	5.3 %	
100-499	*N*	13	21	7	21	3	65
	Exp.	16.7	11.4	6.4	23.4	7.1	18.7 %
	Row pct.	20.0 %	32.3 %	10.8 %	32.3 %	4.6 %	
Column	*N*	89	61	34	125	38	347
Total Row pct.		25.6 %	17.6 %	9.8 %	36.0 %	11.0 %	100.0 %

Chi-Square	***Value***	***DF***	***Significance***
Pearson	43.56894	16	0.00023
Likelihood Ratio	41.25114	16	0.00051
Mantel-Haenszel test for linear association	14.39572	1	0.00015

Minimum Expected Frequency:	2.939
Cells with Expected Frequency < 5:	2 of 25 (8.0%)
Number of Missing Observations:	68

The cross-tabulations based on size classes for years 1992 - 1995 are available from the author on request. These tabulations are similar but not identi-

cal to the above table. They all exhibit statistically significant differences between size categories.

Table A4.6 Second order change patterns of export quotas and distance to markets

		Change pattern export quotas					*Row*
		Incr. growth	*Stable*	*Incr. de-cline*	*Irregular*	*Inte-rmittent*	*Total*
Most distant export market 1991							
Neighbour	*N*	9	6	7	9	2	33
country	*Exp.*	9.4	6.1	3.7	11.8	2.1	10.5 %
	Col%.	10.1 %	10.3 %	20.0 %	8.0 %	10.0 %	
Other	*N*	48	23	19	74	15	179
European	*Exp.*	50.7	33.1	20	63.8	11.4	57.0 %
countries	*Col%*	53.9 %	39.7 %	54.3 %	66.1 %	75.0 %	
World outside	*N*	32	29	9	29	3	102
Europe	*Exp.*	28.9	18.8	11.4	36.4	6.5	32.5 %
	Col%	36.0 %	50.0 %	25.7 %	25.9 %	15.0 %	
Column		89	58	35	112	20	314
Total		28.3 %	18.5 %	11.1 %	35.7 %	6.4 %	100.0 %

Chi-Square	***Value***	***DF***	***Significance***
Pearson	19.35992	8	0.01305
Likelihood Ratio	18.80617	8	0.01593
Mantel-Haenszel test for linear association	3.64819	1	0.05620
Minimum Expected Frequency:	2.102		
Cells with Expected Frequency < 5:	2 of 15 (13.3%)		
Number of Missing Observa-tions:	0		

The cross-tabulations based on the most distant export markets for years 1992 - 1995 are available from the author on request. These tabulations are similar but not identical to the above table. The years 1991, 1993 and 1995

indicate statistically significant differences, while the two remaining years do not.

A.4.3 Export sales

Table A4.7 First order change patterns of export sales, two observations. Distribution of enterprises, percentage.

	1991 -				*1992 -*			*1993 -*		*1994-*
	92	*93*	*94*	*95*	*93*	*94*	*95*	*94*	*95*	*95*
s=0.1										
Non-exporter	49	41	41	38	47	46	44	40	35	37
Stop	2	5	3	4	2	2	2	2	2	1
Decrease	19	16	16	15	15	15	14	17	15	19
Stable	12	13	12	12	15	11	9	14	10	14
Increase	16	20	23	25	18	23	26	24	33	27
Start	2	5	5	6	3	3	5	3	5	2
Sum	100	100	100	100	100	100	100	100	100	100
s=0.2										
Non-exporter	49	41	41	37	47	47	44	40	35	37
Stop	2	5	3	4	2	2	2	2	2	1
Decrease	16	13	10	10	12	10	9	13	12	16
Stable	18	21	22	22	21	19	19	22	17	22
Increase	13	15	19	21	15	19	20	20	29	22
Start	2	5	5	6	3	3	5	3	5	2
Sum	100	100	100	100	100	100	99	100	100	100
s=0.3										
Non-exporter	49	41	41	37	47	46	44	40	35	37
Stop	2	5	3	4	2	2	2	2	2	1
Decrease	12	9	6	7	9	6	5	10	7	13
Stable	24	27	30	30	27	26	27	29	25	28
Increase	11	13	15	16	12	17	17	16	26	19
Start	2	5	5	6	3	3	5	3	5	2
Sum	100	100	100	100	100	100	100	100	100	100
N	1274	1003	856	804	1078	953	869	1036	1083	1025

Table A4.8 Second order change patterns of total export sales. Influence of number of observations and delimitation of stable category.

	Minimum 3 observations		*Minimum 4 observations*		*5 observations*	
	N	*%*	*N*	*%*	*N*	*%*
s=0.1						
Non-exporter	667	41	319	42	111	43
Incremental growth	244	15	84	11	26	10
Stable	37	2	8	1	2	1
Incremental decline	175	11	44	6	7	3
Irregular	443	27	237	31	94	36
Intermittent	68	4	68	9	19	7
Total	1634	100	760	100	259	100
s=0.2						
Non-exporter	667	41	319	42	111	43
Incremental growth	278	17	107	14	34	13
Stable	100	6	28	4	9	4
Incremental decline	179	11	58	7	16	6
Irregular	342	21	180	24	70	27
Intermittent	68	4	68	9	19	7
Total	1634	100	760	100	259	100
s=0.3						
Non-exporter	667	41	319	42	111	43
Incremental growth	281	17	117	15	43	17
Stable	194	12	68	9	20	8
Incremental decline	151	9	50	7	13	5
Irregular	273	17	138	18	53	20
Intermittent	68	4	68	9	19	7
Total	1634	100	760	100	259	100

A.4.4 Distant markets

The distances to the export markets are measured on a crude scale, which is nevertheless quite informative, see Section 7.5. Neighbouring countries can be assumed to have short physical distance - a proxy for transportation cost, combined with easy flow of information, cultural similarity and reciprocal knowledge of languages. These are all important elements of psychic distance. Markets in other European countries have larger physical distance, common traits of culture and language; but importantly, similarities in business, and political and legal environment. Physical and psychic distances increase to the next level of worldwide markets.

As for size, the categories for the location of most distant export markets vary for the enterprises over the total observation period. For three of the observations χ^2 tests were statistically significant, while for two periods (1992 and 1994) they do not.

Table A4.9 Second order change patterns of export quotas and most distant export market 1992.

		Incr. growth	*Stable*	*Incr. decline*	*Irregular*	*Inter-mittent*	*Row total*
Export market							
Neighbouring	*N*	13	7	6	11	2	39
Country	*Exp.*	11.8	7.3	3.6	14.3	2.0	
	Col.pct.	12.3 %	10.8 %	18.8 %	8.6 %	11.1 %	11.2 %
Other	*N*	60	37	21	90	12	220
European	*Exp.*	66.8	41	20.2	80.7	11.3	
	Col.pct	56.6 %	56.9 %	65.6 %	70.3 %	66.7 %	63.0 %
World	*N*	33	21	5	27	4	90
Wide	*Exp.*	27.3	16.8	8.3	33	4.6	
	Col.pct.	31.1 %	32.3 %	15.6 %	21.1 %	22.2 %	25.8 %
Column	*N*	106	65	32	128	18	349
total	*Row pct.*	30.4 %	18.6 %	9.2 %	36.7 %	5.2 %	100.0 %

Cont./

Chi-Square	*Value*	*DF*	*Significance*
Pearson	9.46581	8	0.30454
Likelihood Ratio	9.38178	8	0.31112
Mantel-Haenszel test for linear association	1.34198	1	0.24668

Minimum Expected Frequency:	2.0111
Cells with Expected Frequency < 5:	3 of 15 (20.0%)
Number of Missing Observations:	0

Although the results are not consistent over the five observations, there are certain common traits. First of all, 'other European' markets have a dominant position for all categories of change pattern. Secondly, when we look specifically at the intermittent and irregular categories, these two patterns are not characteristic for exporting to near-by markets. Around 60% of the enterprises in these categories find their most important markets in 'other European' countries and as much as 25% in worldwide countries when all years are taken into account. However, the incremental growth and stable categories are most strongly represented among enterprises that reach farthest out in their search for export markets.

A.4.5 Changes in total sales

The stable category for first order changes of total sales is delimited by fluctuations not exceeding ±10%. The reason for this is twofold. Firstly, the aggregate variation of several activities (here export and domestic sales) will always exhibit less variation than for the individual activities. Secondly, variations in export quotas are measured by a quotient, and should therefore be expected to have larger fluctuations.

Change patterns for total sales have four categories: incremental decline, stable, incremental growth, and irregular. Very few enterprises start or stop selling for one full year and therefore the intermittent category is not included, and non-exporters are not excluded as a separate category.

Table A4.8 illustrates the relationship between change patterns in export quotas and change patterns for total sales.

χ^2 statistics do not indicate any interaction between these two variables. However, the statistics are not reliable due to the large number of cells with an expected frequency less than 5. Nevertheless, the distribution in Table A4.8 warrants some reflections:

Table A4.10 Second order change patterns of export quotas versus second order change patterns for total sales

		Change pattern total sales				
		Increm. growth	*Stable*	*Increm. decline*	*Irregular*	*Row Total*
Change pattern export quotas						
Non-exporter	*N*	26	29	1	32	88
	Exp. value	29.3	27.7	2.8	28.2	23.7 %
	Row pct.	29.5 %	33.0 %	1.1 %	36.4 %	
Incr growth	*N*	34	21	1	29	85
	Exp. value	28.3	26.7	2.7	27.2	22.8 %
	Row pct.	40.0 %	24.7 %	1.2 %	34.1 %	
Stable	*N*	12	19	1	19	51
	Exp. value	17	16	1.6	16.3	13.7 %
	Row pct.	23.5 %	37.3 %	2.0 %	37.3 %	
Incr decline	*N*	4	6	1	10	21
	Exp. value	7	6.6	0.7	6.7	5.6 %
	Row pct.	19.0 %	28.6 %	4.8 %	47.6 %	
Irregular		39	30	7	23	99
	Exp. value	33	31.1	3.2	31.7	26.6 %
	Row pct.	39.4 %	30.3 %	7.1 %	23.2 %	
Intermittent	*N*	9	12	1	6	28
	Exp. value	9.3	8.8	0.9	9	7.5 %
	Row pct.	32.1 %	42.9 %	3.6 %	21.4 %	
Column Total	*N*	124	117	12	119	372
	Row pct.	33.3 %	31.5 %	3.2 %	32.0 %	100.0 %

Chi-Square	***Value***	***DF***	***Significance***
Pearson	21.75885	15	0.11428
Likelihood Ratio	21.74324	15	0.11472
Mantel-Haenszel test for linear association	5.75880	1	0.01641

Minimum Expected Frequency:	0.677
Cells with Expected Frequency < 5:	6 of 24 (25%)
Number of Missing Observations:	163

The number of enterprises with incrementally declining total sales over the four intervals is, quite reasonably, too low for making any reflections or comments.

Enterprises with intermittent and irregular change patterns for export quotas are not inferior to other enterprises as to the development of their total sales. If there is any difference, these enterprises have a better performance than the average for all enterprises.

Enterprises with incrementally declining export quotas are over-represented in the category of irregular development of total sales.

Enterprises with stable export quotas are under-represented in the category of incremental growth of total sales. There are equal and above average representations in the categories of stable and irregular total sales.

Enterprises with incrementally growing export quotas have an average representation in the category of irregular total sales, higher than average in incrementally growing sales and below average in the category of stable total sales.

Appendix 5

A.5 Details of descriptive statistical analyses

A.5.1 Enterprise characteristics

Specialisation

The variables used to measure specialisation are listed in Table A3.3, Appendix 3.

Manufacturing specialisation

Variables V116, V117, and V118 can be seen as defining three typologies of manufacturing systems. Long series production (V118) is most specialised, since this system is built for or adapted to one product or product group. Individual production (V116) will be least specialised since this production form allows adaptation to each individual product. Batch or small series production can be classified as a production form with an intermediate degree of specialisation. These manufacturing forms are technically complementary, but one enterprise may simultaneously use more than one form. The index of manufacturing specialisation will therefore have an additive form.

The values of V116, V117 and V118 have been re-coded to:

Yes = 1

No/missing = 0

A counting variable has been introduced to keep track of the number of 'yes' values of the three variables for each enterprise:

n_1 = {number of value 1 for variables V116, V117, V118}

Further, the weights 1, 2, and 3 respectively are assigned to the three variables to reflect an increasing degree of specialisation, giving the index of manufacturing specialisation the form:

$$MFG = \frac{1 \cdot V116 + 2 \cdot V117 + 3 \cdot V118}{3 \cdot n_1} \qquad [A5.1]$$

The empirical extreme values for the manufacturing specialisation index are:

$MFG_{min} = 1/3$

for V116 = 1; V117 = 0; V118 = 0; $n_1 = 1$.

$MFG_{max} = 1$

for V116 = 0; V117 = 0; V118 = 1; $n_1 = 1$.

Since one of these manufacturing forms must be present, MFG = 0 has no empirical interpretation; and thus indicates missing values.

Product specialisation

The product specialisation index is similarly based on three typologies of product specialisation: final product to stock (V119) indicating low specialisation, final product to order (V120) indicating high specialisation, and the intermediate typology, components to stock and final product to order (V121). In addition product specialisation of the enterprise is characterised by the number of product groups (V401), and the degree of concentration, percentage of total sales, on the three most important of the product groups (V402). These two dimensions of product specialisation can be found as modifications to each other and to the three other measures of product specialisation, and thus have a multiplicative effect. The product specialisation is therefore split into two factors:

$$PRD_1 = \frac{1 \cdot v119 + 3 \cdot V120 + 2 \cdot V121}{3 \cdot n_2} \qquad \text{[A5.2]}$$

and

$$PRD_2 = \frac{V402}{100 \cdot V401} \qquad \text{[A5.3]}$$

$$PRD = PRD_1 \cdot PRD_2 \qquad \text{[A5.4]}$$

In order not to eliminate the effect of PRD, the value of V401 has been recoded:

V401	1	-	3	=	1
	4	-	10	=	2
	11	-	20	=	3
	21	$\rightarrow$		=	4

The extreme values of PRD are:

$PRD_{min} = 1/1200$

for V119 = 1; V120 = 0; V121 = 0; n_2 = 1; V401 = 1 and V402 = 21 →.

PRD_{max} = *1*

for V119 = 0; V120 = 1; V121 = 0; n_2 = 1 V401 = 100 and V402 = 1 to 3.

This minimum value is, however, only a theoretical value. There is no conceivable way for an SME to define three main product groups if these only account for one percent of the total sales.

Market specialisation

The final element of specialisation, market specialisation, has exactly the same structure as product specialisation. The two typologies of market specialisation are defined by customer requirements of the industry sector being highly differentiated (V122) or very similar (V123). The two qualifying factors are number of customer groups (V403) and the percentage of sales for the three most important customer groups (V404). The values of V403 are re-coded to the same ordinal scale as V402. The ensuing format of the market specialisation index is:

$$MRK_1 = \frac{2 \cdot V22 + 1 \cdot V123}{2 \cdot n_3} \qquad \text{[A5.5]}$$

$$MRK_2 = \frac{V404}{100 \cdot V403} \qquad \text{[A5.6]}$$

$$MRK = MRK_1 \cdot MRK_2 \qquad \text{[A5.7]}$$

With extreme values:

MRK_{min} = 1/800

for V122 = 0; V123 = 1; n_3 = 1; V403 = 1; V404 = 21 →.

MRK_{max} = 1

for V122 = 1; V123 = 0; n_3 = 1; V403 = 100; V404 = 1 to 3.

The manufacturing, product and market specialisation define three dimensions of the total enterprise specialisation. As such their aggregate effect is multiplicative:

$$SPC_0 = MFG \cdot PRD \cdot MRK \qquad \text{[A5.8]}$$

with extreme values:

$SPC_{0,min}$ = 1/960000

$SPC_{0,max} = 1$

Effect of a varying number of missing values

The SPSS computation protocol requires that no element in a computation has a missing value. If that is the case, the value of the computation is set to 'system missing'. For this reason it is necessary to either:

1. exclude all cases with a missing value for one or more variables,
2. exclude all variables with a missing value from each computation
3. or replace a missing value with neutral values (0 in additive, 1 in multiplicative relations)

The first solution would reduce the available sample to a critically low number of cases, jeopardising statistical significance as well as introducing bias in the remaining sample.

The second solution is not practically feasible.

The third solution will obscure the difference between 'no' and 'missing value'. For many of the returned questionnaires, the respondents have obviously regarded some of these questions as multiple response questions and only indicated the positive value (1). The consequence of replacing 'missing values' with '0' (zero) for variables V116 to V123 is therefore negligible. By doing so, the counting variables n1, n2, and n3 in some cases will receive the value '0'; and therefore '0' will become 'missing value' for the computed indexes. These must be replaced (re-coded) with the neutral value '1', which must be recognised as the missing value in subsequent correlation analyses.

If the factors of the specialisation index are replaced by a neutral value (1), as discussed above, there will be a dramatic influence on the value of the index due to the multiplicative effect of individual factors. To neutralise the effect of the varying extent of the missing value of variables without eliminating a large number of cases, the specialisation index will be calculated as:

$$SPC = \sqrt[n]{SPC_0} \qquad \text{[A5.9]}$$

where

n = number of existing values of {MFG, MRK_1, MRK_2, PRD_1, PRD_2}.

and

$$SPC_{\max} = \sqrt[5]{1.000} = 1.000$$

$$SPC_{\min} = \sqrt[5]{1/96000} = 0.0636$$

The following example will illustrate the effect of this calculation procedure:

Table A5.1 Effect of missing value of variables on calculated value of specialisation index. Example.

Case	*MFG*	PRD_1	PRD_2	MRK_1	MRK_2	*n*	SPC_0	$SPC_0^{1/n}$
a	0.5	*	*	*	*	1	0.5	0.500
b	0.5	0.4	*	*	*	2	0.20	0.447
c	0.5	0.4	0.3	*	*	3	0.06	0.391
d	0.5	0.4	0.3	0.2	*	4	0.012	0.331
e	0.5	0.4	0.3	0.2	0.1	5	0.0012	0.261

Legend: * = missing value

Characteristics of specialisation index

The statistical characteristics of SPC for each year are exhibited in Table A5.2. The distributions have the same bell-shape as a normal distribution; but are slightly less peaked (negative kurtosis) and have slightly more observations at the 'high tail' than normal distributions (positive skewness). The mean value is quite close to 0.5 each year. Table A5.2 is based on all available cases.

Table A5.2 Distribution characteristics of specialisation index (SPC_i).

Year	*Mean value*	*Std. deviation*	*Skewness*	*Kurtosis*	*Cases (N)*
1991	.4919	.2019	.2141	-.2834	2368
1992	.5040	.1927	.3131	-.1365	3506
1993	.5138	.1780	.2025	-.2835	1936
1994	.5160	.1732	.3071	-.2127	1703
1995	.5109	.1795	.2384	-.3609	1568

Structural measurement model

The factors of entrepreneur characteristics, the stimulation measure and the measures of sales on the local market are used to establish a measurement model for the latent variable 'enterprise characteristics'. The entire list of potential measures is given in Table A5.3. which serves as a legend for Table A5.4 and Figures A5.1, A5.2, and A5.3.

Table A5.3 Variables and factors of entrepreneur and enterprise characteristics

Program code	*Chart code*	*Variables included*	*Description*
spc#	spec	V116, V117, V118, V119, V120, V121, V122, V123, V401, V402, V403, V404	Specialisation index; 0=min 1=max
v126#	subsup		Sub-supplier; dichotomous
v127#	famb		Family enterprise
v407#	locs		Share of total sales on local markets (radius 50 km)
ent9#a1	plan	V909, V910, V911	Preference for planning
ent9#a2	capab	V902, V903, V904	Capability; experience in business, language skills, and foreign experience of manager
ent9#b1	stab	V907, V908	Preference for stability
ent9#b2	intvn	V905, V906	Objection to external intervention
v901#	educ		Age finished education (cut-off extremes: 40 years)
v912#	fmgr		Management of family business
v913#	lrgbs		Interaction between small and large enterprises
v914#	recr		Manager participation in recruitment
v915#	ethic		Follow ethical principles
v916#	fprio		Business before family
ξ1#	firm		Enterprise characteristics; latent variable
ξ2#	mgr		Entrepreneur characteristics; latent variable

= code for year; 1=1991, etc.

Two of the variables in this list are dichotomous and therefore not suited for inclusion in the LISREL measurement model at this point. The possible ef-

fects of the variables identifying sub-suppliers (V126) and family firms (V127) will therefore be tested at later stages; and these variables will not be included in the measurement model.

Input data for the LISREL program may be a covariance matrix or a correlation matrix. By using a covariance matrix the nominal values of the relationships are given directly by the output. However, interpretation is obscured by strong influence from the scale of measurement for each variable. By choosing a correlation matrix as input, variables are, for practical terms, standardised. All loading factors may be interpreted as regression coefficients with a possible area of variation from -1 to +1. This is best suited for tests where the main objective is to ascertain relationships, not to assess the real value of net effect of the relationships. Correlation matrices are chosen for the present analyses. The correlation matrices of the measures used in the measurement model are presented in Table A5.4. Correlation coefficients with absolute values of 0.3 or greater are in bold print. The general picture is that the correlation coefficients are very low.

Table A5.4 Enterprise characteristics, correlation coefficients. Panel firms

	spc#	*v407#*	*plan#*	*capab#*	*stab#*	*intvn#*	*v901#*	*v912#*	*v913#*	*v914#*	*v915#*	*v916#*
1991		N=255										
SPC1	1.000											
V4071	.043	1.000										
ENT91A1	-.013	.002	1.000									
ENT91A2	-.184**	-.253**	.049	1.000								
ENT91B1	-.008	.129*	**.315****	-.176**	1.000							
ENT91B2	-.029	-.008	.120	.093	.036	1.000						
V9011	-.087	-.035	.002	.220**	-.093	-.045	1.000					
V9121	.044	.207**	.182**	**-.322****	**.391****	.068	-.155*	1.000				
V9131	.055	-.186**	.001	.054	-.247**	.124*	.013	-.078	1.000			
V9141	.004	.083	.117	-.141*	.140*	.089	-.084	.264**	.113	1.000		
V9151	-.065	-.009	.110	.134*	-.125*	-.014	.124*	-.128*	.150*	.143*	1.000	
V9161	.044	-.139*	.041	-.078	.105	.067	-.082	.061	.093	.220**	-.116	1.000

Legend ** = signif. ≤ 0.01 ; * = signif. ≤ 0.05 Cont./

Table A5.4 Enterprise characteristics, correlation coefficients. Panel firms /Cont.

	spc#	*v407#*	*plan#*	*capab#*	*stab#*	*intvn#*	*v901#*	*v912#*	*v913#*	*v914#*	*v915#*	*v916#*
1992			N=339									
SPC2	1.000											
V4072	.059	1.000										
ENT92A1	.041	-.036	1.000									
ENT92A2	-.103	**-.325****	.063	1.000								
ENT92B1	.134*	.250**	.236**	-.191**	1.000							
ENT92B2	.068	.014	.086	.015	-.013	1.000						
V9012	-.056	-.089	.048	.180**	-.036	.054	1.000					
V9122	.122*	.230**	.147**	-.234**	**.338****	.096	-.102	1.000				
V9132	.034	-.073	-.024	-.047	-.158**	.132*	-.024	-.038	1.000			
V9142	.103	.025	.109*	-.010	.005	.061	-.029	.129*	.158**	1.000		
V9152	-.013	-.153**	.018	.102	-.054	.035	.041	-.081	-.022	.079	1.000	
V9162	-.056	-.118*	.048	.126*	-.055	.116*	-.010	.034	.116*	.143**	-.019	1.000
1993			N=310									
SPC3	1.000											
V4073	.145*	1.000										
ENT93A1	.025	.085	1.000									
ENT93A2	-.123*	-.245**	-.066	1.000								
ENT93B1	.102	.203**	.276**	-.258**	1.000							
ENT93B2	.003	.078	.072	.006	-.010	1.000						
V9013	-.091	-.101	.035	.214**	-.031	.053	1.000					
V9123	.126*	.234**	.193**	-.215**	.260**	.160**	-.136*	1.000				
V9133	.124*	-.067	-.066	.021	-.184	.015	-.008	-.028	1.000			
V9143	.068	.068	.053	-.145*	.030	.008	-.050	.167**	.104	1.000		
V9153	-.112*	-.085	.078	.096	-.107	.088	.123*	.010	.053	.147**	1.000	
V9163	.046	-.022	.032	.001	-.006	.123*	-.014	.086	.083	.107	.037	1.000

Legend ** = signif. ≤ 0.01 ; * = signif. ≤ 0.05 Cont./

Table A5.4 Enterprise characteristics, correlation coefficients. Panel firms /Cont.

	spc#	*v407#*	*plan#*	*capab#*	*stab#*	*intvn#*	*v901#*	*v912#*	*v913#*	*v914#*	*v915#*	*v916#*
1994			N=340									
SPC4	1.000											
V4074	.263**	1.000										
ENT94A1	.093	.048	1.000									
ENT94A2	-.222**	**-.332****	-.041	1.000								
ENT94B1	.090	.174**	.282**	-.263**	1.000							
ENT94B2	.009	-.014	.006	-.090	-.074	1.000						
V9014	-.072	-.097	-.037	.203**	-.152**	.021	1.000					
V9124	.163**	.191**	.210**	-.282**	**.322****	.078	-.200**	1.000				
V9134	.046	-.125*	-.149**	.019	-.236**	.187**	-.025	-.053	1.000			
V9144	.097	.103	.068	-.109*	.085	.119*	-.025	.190**	.077	1.000		
V9154	-.059	-.111*	-.034	.096	-.088	.032	.007	-.084	-.083	.029	1.000	
V9164	-.143**	-.065	-.017	.051	-.031	.047	.007	.100	.052	-.056	-.055	1.000
1995			N=346									
SPC5	1.000											
V4075	.200**	1.000										
ENT95A1	.072	-.006	1.000									
ENT95A2	-.170**	**-.411****	.042	1.000								
ENT95B1	.051	.270**	.292**	-.260**	1.000							
ENT95B2	.018	.073	.056	-.067	.068	1.000						
V9015	-.110*	-.158**	-.002	.230**	-.167**	-.007	1.000					
V9125	.080	**.362****	.139**	-.252**	**.357****	.129*	-.173**	1.000				
V9135	.039	-.072	-.103	-.030	-.173**	.151**	-.098	-.029	1.000			
V9145	.142**	.102	.082	-.099	.146**	.118*	-.224**	.259**	.066	1.000		
V9155	.030	-.131*	.195**	.089	-.102	-.018	.092	-.005	.057	.137*	1.000	
V9165	-.045	-.035	.045	-.079	.073	.109*	-.066	.117*	-.013	.053	.017	1.000

Legend ** = signif. ≤ 0.01 ; * = signif. ≤ 0.05

The initial measurement model is presented graphically in Figure A5.1.

The actual values of error terms, δ, loading of the different factors and variables, λ, and the correlation between two concepts, φ, are given in Table A5.5

Figure A5.1 Enterprise/entrepreneur characteristics. Initial measurement model

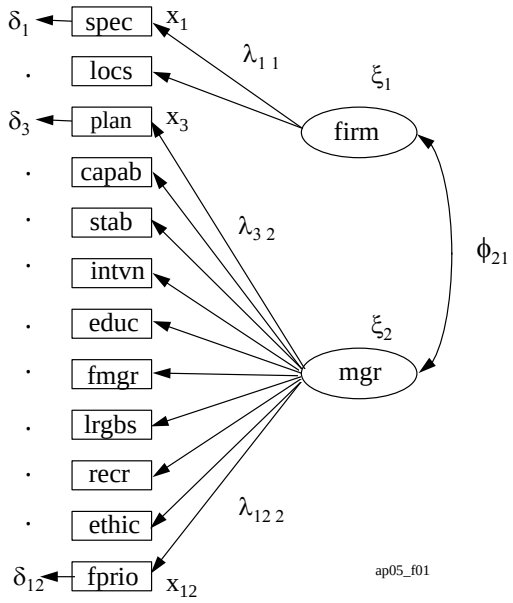


Table A5.5 Enterprise characteristics - Error terms and regression terms of initial measurement model, cf. Figure A5.1

δ_1	δ_2	δ_3	δ_4	δ_5	δ_6	δ_7	δ_8	δ_9	δ_{10}	δ_{11}	δ_{12}	$\varphi_{1\,2}$
.99	.86	.94	.81	.69	1.00	.94	.50	.97	.90	.97	.98	.78
$\lambda_{1\,1}$	$\lambda_{2\,1}$	$\lambda_{3\,1}$	$\lambda_{4\,2}$	$\lambda_{5\,2}$	$\lambda_{6\,2}$	$\lambda_{7\,2}$	$\lambda_{8\,2}$	$\lambda_{9\,2}$	$\lambda_{10\,2}$	$\lambda_{11\,2}$	$\lambda_{12\,2}$	
.12	.37	.25	-.44	.56	.06	-.24	.71	-.17	.32	-.17	.14	

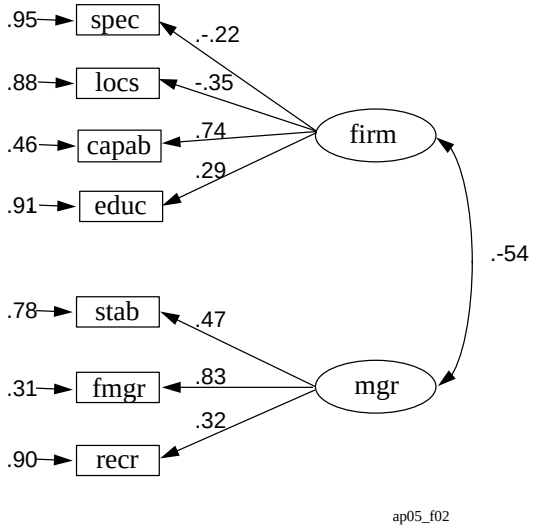
The commonly used goodness of fit indices (Hair *et al.*, 1995:682 ff.) indicate a borderline acceptable fit for the initial measurement model, see Table A5.6 However, the high values of the error terms (δ values) mean that in relationship to the calculated variations of the latent variables *firm characteristics* and *manager characteristics* there are extremely high unexplained vari-

ances in the exogenous variables. The combination of these two assessments indicates that the measurement model should be improved.

The procedure for improving measurement models prescribes elimination of elements and simplification of relational structures, all in accordance with the principle of parsimony. By following this procedure an intermediate measurement model, depicted in Figure A5.2, was established. Here error terms and regression terms are included in the figure.

The error terms, δ - values cf. Figure A5.1, display great variation and are, for most measures, quite high. This indicates possible problems with the measuring instruments, but also a possibility that the exogenous variables have other dimensions than what are tapped by the present latent variables. Once again the goodness of fit indices, see Table A5.6, indicate barely acceptable fit of also this version of the measurement model.

Figure A5.2 Enterprise/entrepreneur characteristics. Intermediate measurement model. 1991 data, panel firms



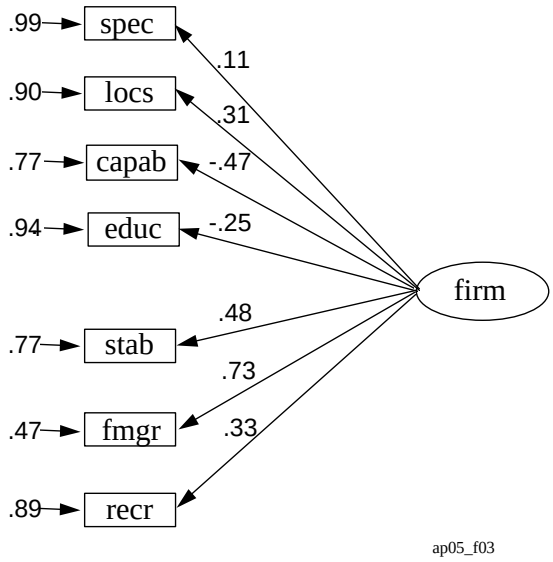
Some of the regression factors, λ - values, are quite high, indicating a high degree of co-variation between the exogenous variables and the latent variables. We also notice that the absolute value of the covariance, ϕ, between the two latent variables, firm and mgr, is as high as 0.54, which confirms the

initial assumption. The negative value indicates that management's desire for control and stability is negatively correlated with higher education and capabilities, but positively correlated with a higher degree of specialisation and focus on local markets.

The most noticeable difference between the initial measurement model and the intermediate model is that *capability* and *education* do not load on the entrepreneur, but on the enterprise. The interpretation of this is that there is a stronger correlation between these two variables and structural parameters of the firm, here represented by specialisation and sales on the local market, than with measures of attitudes of the manager.

Once again the combination of high values for the error terms and doubtful goodness of fit statistics indicate that further improvements are required. By further pursuing the principle of simplification, the final measurement model, Figure A5.3, is established through trial and error, guided by intermediate results.

Figure A5.3 Enterprise/entrepreneur characteristics. Final measurement model.



Like the earlier versions, the final measurement model does not satisfy the combination of goodness of fit criteria and assessment of error terms.

Table A5.6 Measurement models, goodness of fit statistics

	Initial model	*Intermediate model*	*Final model*
Root mean square error of approximation	0.079	0.078	0.083
Root mean square residual	0.076	0.087	0.090
Goodness of fit index	0.091	0.91	0.90
Critical N	148.83	149.92	138.03
Total assessment	doubtful	doubtful	doubtful

The conclusion is that the data are not suited for analyses using structural modelling of the LISREL program.

A.5.2 Export stimuli

The procedures used to find stable factors of export stimuli are identical to the procedures used for analysing entrepreneur characteristics, see Section 7.2.1.

Factor analysis of the measures of export stimuli did not converge on the expected distinction between external and internal stimuli, but on nine factors after splitting the data set into three groups. The numbering of the factors in Table A5.7 reflects the share of the total variance within the group which is explained by the factor, the lowest index indicating highest explained variance.

The three sub-groups have been established through trial and error, cf. Section 7.2.1 to identify factors that are stable over time. The initial analysis for export stimuli included all variables, as did the factor analysis of entrepreneur characteristics. Since these variables exhibit varying patterns of correlation over the years, the ensuing factors from the three groups will also exhibit varying correlation over the years.

In Table A5.8 the temporally stable factors, characterised by identical combinations of significantly loading variables, are consolidated. The descriptions indicate that meaningful interpretation of the factors can be made.

Two comments can be attached to this table. First of all, three of the stable factors do not comply with the initial (assumed) categories internal and external stimuli. Secondly, there is hardly any multi-dimensionality in these factors. There are few and very similar variables loading on each factor. The reduction in dimensions is a direct effect of the imposed requirement of temporal stability in the composition of the factors.

Table A5.7 Export stimuli - extraction of stable factors

Variables sub group 1

Vari-	*Factors*																			
able	*1991*				*1992*				*1993*				*1994*				*1995*			
	a1	*a2*	*a3*	*a4*	*a1*	*a2*	*a3*	*a4*	*a1*	*a2*	*a3*	*a4*	*a1*	*a2*	*a3*	*a4*	*a1*	*a2*	*a3*	*a4*
V786				.83				.85				.86				.88				.86
V787				.83				.81				.83				.86				.85
V788	.95					.93				.91			.93				.93			
V789	.95					.94				.93			.94				.93			
V790			.85				.84				.84				.82			.83		
V791			.87				.88				.85				.86			.85		
V792		.76			.77				.76					.75					.77	
V793		.75			.76				.72			.35		.77					.73	
V794		.74			.75				.74					.67					.69	
V797			.41				.38				.41				.42			.48		
Expl%	26	19	13	11	26	18	13	10	28	16	13	11	26	17	13	12	28	16	13	10
KMO	.64				.63				.66				.62				.65			
Bart-let	2293			.00	2389			.00	2241			.00	2364			.00	1577			.00

Variables sub group 2

	b1	*b2*	*b3*	*b1*	*b2*	*b3*	*b1*	*b2*	*b3*	*b1*	*b2*	*b3*	*b1*	*b2*	*b3*
V795			.80		.82				.77		.76			.78	
V7961			.77		.81				.83		.84			.81	
V802		.69				.74		.69				.65			.67
V803		.87				.82		.85				.87			.86
V804	.71			.70			.74			.68			.76		
V805	.68			.69			.73			.74			.77		
V806	.73			.69			.74			.69			.68		
V807	.62			.64			.63			.69			.64		
Expl %	29	15	14	29	17	12	31	15	14	32	15	13	37	13	11
KMO	.68			.72			.76			.75			.83		
Bartlet	846		.00	909		.00	1047		.00	1107		.00	909		.00

Cont./

Table A5.7 Export stimuli - extraction of stable factors /Cont.

Variables sub group 3

Variable	*Factors*									
	1991		*1992*		*1993*		*1994*		*1995*	
	c1	*c2*	*c1*	*c2*	*c1*	*c2*	*c1*	*c2*	*c1*	*c2*
V798		.82		.71		.81		.74		.66
V799		.77		.85		.80		.82		.85
V800	.80		.79		.82		.81		.76	
V801	.87		.85		.87		.85		.86	
Expl%	42	27	43	25	43	26	42	25	43	23
KMO	.57		.62		.59		.60		.63	
Bartlet	311	.00	345	.00	397	.00	329	.00	215	.00

Table A5.8 Temporally stable factors of export stimuli

Program code	*Chart code*	*Description*		*Included variables*	*1991*	*1992*	*1993*	*1994*	*1995*
Variables sub group 1									
es01#	tech	Technical competence	i	v786 v787	a4	a4	a4	a4	a4
es02#	cost	Cost	i/e	v788, v789	a1	a2	a2	a1	a1
es03#	supl	Supply chain	e	v790, v791, v797	a3	a3	a3	a3	a2
es04#	cpac	Capacity	i/e	v792, v793, v794	a2	a1	a1	a2	a3
Variables sub group 2									
es05#	econ	Economic incentives	e	v795, v796	b3	b2	b3	b2	b2
es06#	barr	External barriers	e	v802, v803	b2	b3	b2	b3	b3
es07#	copy	Model adaptation	i/e	v804, v805, v806, v807	b1	b1	b1	b1	b1
Variables sub group 3									
es08#	poli	Political climate	e	v798, v799	c2	c2	c2	c2	c2
es09#	prod	Export product	i	v800, v801	c1	c1	c1	c1	c1

Legend: e = assumed external factor; i = assumed internal factor

Correlation between export stimulating factors

Table A5.9 gives the correlation coefficients between the nine factors of export stimuli for each of the years 1991-95. Correlation coefficients that are larger than 0.3 appear in bold.

The general tendency is that correlation coefficients are low. The interpretation of this is that the significance of the factors and combinations of factors are unique to each enterprise. The enterprises have individual approaches to their response to stimuli. It is also a characteristic feature that some of these correlation coefficients are higher than 0.3 for all years, while others fluctuate between higher and lower values than 0.3. This is similar to what was experienced when attempting to establish temporally stable factors: The patterns of correlation between factors as well as individual variables tend to fluctuate over time.

Table A5.9 Correlation between export stimulating factors

	ex01#	*ex021#*	*ex03#*	*ex04#*	*ex05#*	*ex06#*	*ex07#*	*ex08#*	*ex09#*
1991									
es011	1.000								
es021	.020	1.000							
es031	-.024	-.012	1.000						
es041	.002	-.014	-.005	1.000					
es051	-.050	.241**	.038	.153**	1.000				
es061	.109**	.197**	.120**	.048	-.025	1.000			
es071	.269**	.120**	.183**	**.350****	-.012	.005	1.000		
es081	.239**	.142**	.161**	.154**	.061	.139**	.275**	1.000	
es091	**.312****	.074*	.150**	.298**	.019	.197**	**.346****	.045	1.000

Legend * = signif. ≤ .05 ; ** = signif ≤ .01 Cont./

Table A5.9 Correlation between export stimulating factors /Cont.

	ex01#	*ex021#*	*ex03#*	*ex04#*	*ex05#*	*ex06#*	*ex07#*	*ex08#*	*ex09#*
1992									
es012	1.000								
es022	-.006	1.000							
es032	.004	.007	1.000						
es042	.006	.007	.004	1.000					
es052	-.007	.246**	.080*	.172**	1.000				
es062	.044	.119**	.219**	.031	.000	1.000			
es072	.183**	.134**	.164**	**.354****	.002	.004	1.000		
es082	.298**	.072*	.125**	.147**	.103**	.169**	.219**	1.000	
es092	.231**	.015	.230**	.294**	-.017	.159**	**.380****	-.000	1.000
1993									
es013	1.000								
es023	.005	1.000							
es033	.018	-.004	1.000						
es043	.002	.011	-.015	1.000					
es053	.029	.149**	.059	.120**	1.000				
es063	.080*	.102**	**.310****	-.023	-.007	1.000			
es073	.233**	.087*	.153**	**.407****	.015	.006	1.000		
es083	.130**	.040	.169**	.098**	.156**	.152**	.255**	1.000	
es093	**.311****	.098**	.181**	**.335****	.086*	.181**	**.387****	-.000	1.000
1994									
es014	1.000								
es024	-.011	1.000							
es034	-.026	-.005	1.000						
es044	.003	.008	.003	1.000					
es054	.015	.181**	.135**	.137**	1.000				
es064	.049	.146**	.244**	-.067	.005	1.000			
es074	.160**	-.011	.185**	**.407****	-.014	-.025	1.000		
es084	.183**	.109**	.141**	.106**	.196**	.145**	.177**	1.000	
es094	.287**	.011	.196**	**.317****	-.053	.137**	**.429****	-.009	1.000

Legend * = signif. ≤ .05 ; ** = signif ≤ .01 Cont./

Table A5.9 Correlation between export stimulating factors /Cont.

	ex01#	*ex021#*	*ex03#*	*ex04#*	*ex05#*	*ex06#*	*ex07#*	*ex08#*	*ex09#*
1995									
es015	1.000								
es025	-.244**	1.000							
es035	.083*	.114**	1.000						
es045	.023	-.054	.051	1.000					
es055	-.004	.205**	.102**	.263**	1.000				
es065	.053	.099**	**.363****	-.087*	.034	1.000			
es075	.233**	-.014	.280**	**.438****	.028	-.000	1.000		
es085	.239**	.067	.248**	.188**	.200**	.161**	**.338****	1.000	
es095	.222**	-.048	**.317****	**.306****	.086*	.205**	**.416****	-.002	1.000

Legend * = signif. ≤ .05 ; ** = signif ≤ .01

A.5.3 External interaction

The variables used to measure external interaction are listed in Tables A3.6, A3.7, and A3.8 of Appendix 3. The data have three main dimensions, as illustrated in Figure 6.4: *co-operation, information exchange, and distribution channels*. These three dimensions are most likely strongly interrelated, but this issue is not essential here and will not be explored in this thesis.

Co-operation

The international nature of co-operation is defined by two variables: domicile of partner and venue of co-operation. Both variables are dichotomous with the values domestic and foreign. The variables define a two-by-two matrix of increasing international orientation of co-operation where values are assigned according to the following coding table:

Table A5.10 Assigning weight to scale of co-operation, ordinal scale

		Venue of co-operation	
		Domestic	*Foreign*
Domicile of	*Domestic*	1/4	2/4
partner	*Foreign*	3/4	4/4

Information exchange

The information exchange of an enterprise related to internationalisation may take place within one area or topic of its operation, or encompass numerous areas. A total of 11 options of areas of information exchange were listed as multiple response questions in the questionnaire. An index of information topics has been created by counting the number of positive responses and dividing by the maximum possible:

$$ITOPi = \{\text{Number of positive responses}\}/11 \qquad [A5.10]$$

$$0 \leq ITOPi \leq 1$$

A high value of ITOPi indicates information exchange on a wide range of the enterprise activities.

A dichotomous variable, IEXCHi, is used to identify the source of information as being domestic, IEXCHi =1, or foreign IEXCHi=2. If both domestic and foreign sources are used, the enterprise is coded as using foreign sources since the enterprise has such a capability. The scale is finally calibrated by dividing by 2.

Distribution channel

The distribution channel of an enterprise may allow direct contact with customers or may include obstacles to information flow in the form of intermediaries. The ordinal variable CHAN is created to measure the channels' conductivity to customer contact, using an ordinal scale of six categories for increasing the potential for customer contact:

Table A5.11 Assigning weight to scale of distribution channel contact, ordinal scale

Category of distribution channel	*Assigned value*
Out-licensing of products	1
Sub supplier to exporting manufacturer	2
Sales through agents	3
Production company abroad	4
Sales company abroad	5
Direct sales to foreign customer	6

As above, if more than one channel is used the category with the highest value for customer contact is applied. The scale is calibrated by dividing by 6.

The international orientation of the enterprise information exchange will be higher when the customer of the enterprise is foreign than if the customer is domestic. This is measured by the dichotomous variable CLOC (customer location) with assigned values 1 for domestic customers only, and 2 for also having foreign customers. The scale is calibrated by dividing by 2.

Consolidated index of external interaction

The principle for the consolidated index of distribution is the same as for the specialisation index. Each of the factors discussed above is calibrated in equation A5.11 to give the maximum value 1 and minimum value 0. The same procedures as for specialisation index are also used for inclusion of cases where some of these measures are missing: a missing value for one of the factors is replaced with the neutral value, 1, for that factor. N_i is the number of factors where valid observation of the factor exists.

$$EXIN_i = \sqrt[N_i]{COOP_i \cdot IEXCH_i \cdot ITOP_i \cdot CHAN_i \cdot CLOC_i} \qquad [A5.11]$$

N_i = number of factors with valid observations; $1 \leq N_i \leq 5$

i = indicator of observation year.

$0 < EXIN_i \leq 1$

$EXIN_i = 1$; maximum external interaction

The central features of the distribution characteristics of EXIN are displayed in Table A5.12.

Table A5.12 Distribution characteristics of external interaction, ($EXIN_i$)

Year	*Mean value*	*Std.deviation*	*Skewness*	*Kurtosis*	*Cases (N)*
1991	.4937	.1947	.3854	-1.1135	694
1992	.4678	.1794	.5364	-.6518	697
1993	.4980	.1895	.1489	-.6402	490
1994	.5045	.1885	.2990	-.9796	452
1995	.5251	.1760	.2480	-.8545	405

All available cases have been used for these calculations. Negative values of kurtosis mean that the distributions are less peaked than a normal distribution; and positive values for skewness mean that there are more observations at the high end than for normal distributions.

A.5.4 Export markets

Number of markets

The number of export markets is simply a counting operation over the variables V714a to V714p, see Table A3.5, Appendix 3. The measure is the number of national markets where the enterprise had export sales during the past year.

Distance to most distant market

The distance measure is relative to the location of the enterprise. This necessitates a distance scale which is simple and yet reflects the most important elements of distance: cost and time as well as cultural and language differences. The geographic distance to the export markets will only to a certain extent reflect these elements.

Variable V716 records the most important export market of the enterprise. In order to obtain a uniform measure for all countries, this variable has been re-coded into four categories, cf. Figure 6.7.

Table A5.13 Most distant export market, ordinal scale

Market	*Assigned value*
Domestic markets	1
Neighbouring countries' markets	2
Other European markets	3
World-wide markets	4

Neighbouring countries are defined as those countries having common borders or having shorelines to the same body of water as the home country of the enterprise.

Other European markets include markets in all European countries which are not defined as domestic or neighbouring country markets.

World-wide markets include all countries which are not included in the previous categories.

The ensuing distributions of distances to the most distant export markets are:

Table A5.14 Most distant markets. Distribution of enterprises

	1991		1992		1993		1994		1995	
Market	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Domestic	503	42	574	43	496	40	474	39	423	37
Neighbouring country	153	13	178	13	158	13	182	15	157	14
Other European	369	31	425	31	396	32	384	32	370	32
World wide	172	14	175	13	186	15	172	14	202	17
Total	1179	100	1352	100	1236	100	1212	100	1152	100

Table A5.15 Number of export markets. Distribution of enterprises

No. of	1991		1992		1993		1994		1995	
markets	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
0	843	55	574	43	493	40	472	39	423	37
1	192	13	232	17	190	15	217	18	199	17
2	143	9	162	12	142	11	167	14	124	11
3	107	7	137	10	137	11	109	9	160	14
4	100	6	80	6	107	9	85	7	80	7
5	67	4	86	6	70	6	45	4	52	4
≥6	86	6	81	6	97	8	117	9	114	10
Total	1538	100	1352	100	1236	100	1212	100	1152	100

Appendix 6

A.6 Details of causal statistical analyses

A.6.1 Categorical variables' effect on export orientation

A total of three categorical variables have so far been kept aside from the process of data reduction. They are: *industry sector (V103), family ownership (V127),* and *nationality (V101).* The reasons have been partly an intention to specifically examine the effects of these factors, partly the problems of establishing reliable correlation coefficients with a mixture of metric and categorical variables.

Due to large variations in the number of cases from each country and structural similarities of their market conditions, the national variable will, from this point, be recoded to a region variable with three values:

Table A6.1 Variable Regio

Value	*Value label*	*Countries*
1	Centr	Austria and Switzerland
2	BeNe	Belgium and Netherlands
3	Nord	Finland, Norway, and Sweden

A first step is a simple identification of possible relationships between the three categorical variables and the two measures of export orientation. Table A6.2 through Table A6.8 clearly illustrate that there are interactions between the endogenous variables *change in export rate* and *change in market extension* on the one hand and the categorical exogenous variables *family enterprise, regional location,* and *industry sector* on the other. Additionally, the tables clearly indicate interaction between these categorical variables. Finally, it is evident that total levels as well as interaction patterns fluctuate over time.

Table A6.2 Family ownership, Region and Industry sector versus Export orientation. One way interactions

	1991/92		1992/93		1993/94		1994/95	
Relationship	*F*	*Sign. of F*	*F*	*Sign. of F*	*F*	*Sign. of F*	*F*	*Sign. of F*
*Change in **export quota** and*								
Family ownership	0.455	0.500	0.565	0.453	0.335	0.563	0.616	.432
Region	0.081	0.922	1.757	0.174	1.010	0.365	1.001	.368
Industry sector	1.383	0.239	0.792	0.551	0.696	0.595	0.798	.527
*Change in **market extension** and*								
Family ownership	14.421	0.000	10.277	0.001	18.111	0.000	18.391	0.000
Region	10.212	0.000	14.069	0.000	37.080	0.000	56.346	0.000
Industry sector	12.243	0.000	12.299	0.000	8.620	0.000	7.944	0.000

The actual distributions of mean values are, for all practical purposes, given by the marginal distributions of the tables below. The cumulative effect of missing values in two variables produce small differences from the distributions of single variables.

Table A6.3 Change in export quotas. Family enterprises and region.

	Family enterprise					
Interval	*Yes*		*No*		*Total*	
Region	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*
1991/92						
Centr	1.25	611	63.55	97	10.73	873
BeNe	1.47	59	0.96	14	1.35	83
Nord	6.74	396	34.12	216	15.30	744
Total	4.61	1066	35.3	327	12.85	1700
Interaction	*F* .554		*Sig. of F* .575			
1992/93						
Centr	19.48	689	1.40	101	16.21	873
BeNe	126.70	59	201.10	14	148.60	83
Nord	20.57	445	1.33	223	14.14	744
Total	27.52	1193	16.49	338	23.95	1700
Interaction	*F* .329		*Sig. of F* .720			
1993/94						
Centr	18.48	663	46.64	117	22.67	873
BeNe	1.72	60	0.83	11	1.66	83
Nord	50.81	448	10.23	229	36.87	744
Total	32.65	1171	20.38	357	29.24	1700
Interaction	*F* .427		*Sig. of F* .653			
1994/95						
Centr	14.27	651	27.5	101	15.67	873
BeNe	1.56	50	1.01	6	1.52	83
Nord	24.84	448	10.99	212	19.63	744
Total	18.25	1149	15.35	319	17.01	1700
Interaction	*F* 0.338		*Sig. of F* 0.713			

Table A6.4 Change in market extension. Family enterprise and region.

	Family enterprise					
Interval	*Yes*		*No*		*Total*	
Region	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*
1991/92						
Centr	2.28	611	3.27	97	2.09	873
BeNe	6.48	59	15.14	14	7.73	83
Nord	9.09	396	14.01	216	10.37	744
Total	5.06	1066	10.87	327	5.93	1700
Interaction	*F*	1.378	*Sig. of F*	.253		
1992/93						
Centr	3.08	689	3.75	101	2.98	873
BeNe	7.81	59	12.04	14	8.21	83
Nord	10.32	445	13.98	223	11.27	744
Total	6.26	1193	10.8	338	7.04	1700
Interaction	*F*	.843	*Sig. of F*	.431		
1993/94						
Centr	2.71	663	3.89	117	2.75	873
BeNe	16.60	60	30.50	11	16.90	83
Nord	10.10	448	14.86	229	11.24	744
Total	6.29	1171	11.42	357	7.12	1700
Interaction	*F*	.863	*Sig. of F*	.423		
1994/95						
Centr	2.37	651	4.08	101	2.49	873
BeNe	22.74	50	36.58	6	21.50	83
Nord	12.14	448	14.66	212	12.95	744
Total	7.36	1149	11.82	319	8.07	1700
Interaction	*F*	6.299	*Sig. of F*	0.002		

Table A6.5 Change in export quotas. Industry sectors and regions.

	Industry sector											
Interval	*TEXT*		*ELEC*		*FOOD*		*WOOD*		*MECH*		*Total*	
Region	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*
1991/92												
Centr	1.02	107	56.79	62	0.88	151	0.88	189	1.91	170	10.73	873
BeNe	1.21	13	1.18	11	1.06	12	1.62	19	1.39	18	1.35	83
Nord	1.38	109	1.15	121	1.00	112	17.55	114	37.33	172	15.30	744
Total	1.30	229	14.51	194	0.96	275	11.31	322	26.45	360	12.85	1700
Interaction		*F*	0.169		*Sig. of F*		0.995					
1992/93												
Centr	8.73	130	0.99	65	1.02	162	29.42	219	28.10	187	16.21	873
BeNe	0.95	11	0.99	9	0.97	12	300.70	18	169.30	23	148.60	83
Nord	1.26	115	19.25	130	22.13	134	16.73	130	13.35	179	14.14	744
Total	3.17	256	13.94	204	13.22	308	46.44	367	31.56	389	23.95	1700
Interaction		*F*	1.537		*Sig. of F*		0.153					
1993/94												
Centr	1.87	121	1.15	70	25.93	162	14.45	207	29.63	176	22.67	873
BeNe	1.19	15	0.88	9	0.98	7	2.82	16	1.99	20	1.66	83
Nord	43.86	119	35.06	123	63.62	132	60.08	127	1.31	190	36.87	744
Total	27.61	255	23.13	202	44.72	301	34.80	350	13.13	386	29.24	1700
Interaction		*F*	0.725		*Sig. of F*		0.669					
1994/95												
Centr	1.18	129	1.05	71	22.82	155	25.74	220	1.43	163	15.67	873
BeNe	1.10	14	0.65	12	1.26	9	1.89	18	2.04	17	1.52	83
Nord	15.87	119	39.51	131	1.66	126	15.00	128	23.47	182	19.63	744
Total	11.37	262	24.29	214	12.00	290	19.90	366	13.13	362	17.01	1700
Interaction		*F*	0.292		*Sig. of F*		0.969					

Table A6.6 Change in market extension. Industry sectors and regions

	Industry sector											
Interval	*TEXT*		*ELEC*		*FOOD*		*WOOD*		*MECH*		*Total*	
Region	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*
1991/92												
Centr	4.83	107	9.60	62	0.67	151	0.82	189	2.37	170	2.09	873
BeNe	10.69	13	8.11	11	9.58	12	5.67	19	7.14	18	7.73	83
Nord	11.76	109	12.35	121	5.77	112	9.26	114	15.42	172	10.37	744
Total	8.80	229	11.19	194	3.36	275	4.10	322	8.39	360	5.93	1700
Interaction		*F*	2.465		*Sig. of F*		0.013					
1992/93												
Centr	6.52	130	8.10	65	1.51	162	1.44	219	3.43	187	2.98	873
BeNe	12.22	11	0.40	9	8.90	12	6.71	18	10.51	23	8.21	83
Nord	13.10	115	12.47	130	5.30	134	9.83	130	16.47	179	11.27	744
Total	10.24	256	10.69	204	3.70	308	4.61	367	9.88	389	7.04	1700
Interaction		*F*	4.600		*Sig. of F*		0.000					
1993/94												
Centr	7.70	121	5.21	70	1.04	162	1.36	207	2.87	176	2.75	873
BeNe	23.75	15	22.00	9	22.88	7	15.33	16	8.00	20	16.90	83
Nord	13.37	119	14.60	123	6.02	132	9.01	127	14.89	190	11.24	744
Total	11.29	255	11.55	202	4.27	301	4.73	350	9.00	386	7.12	1700
Interaction		*F*	3.171		*Sig. of F*		0.002					
1994/95												
Centr	4.49	129	6.64	71	1.42	155	1.31	220	2.94	163	2.49	873
BeNe	30.38	14	41.00	12	28.57	9	24.00	18	9.53	17	21.50	83
Nord	13.98	119	14.22	131	8.70	126	11.73	128	16.90	182	12.95	744
Total	10.63	262	12.53	214	6.32	290	5.97	366	10.19	362	8.07	1700
Interaction		*F*	6.896		*Sig. of F*		0.000					

Table A6.7 Change in export quotas. Industry sector and family enterprise

Interval	*Industry sector*											
Family	*TEXT*		*ELEC*		*FOOD*		*WOOD*		*MECH*		*Total*	
owner-ship	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*
1991/92												
Yes	1.35	180	1.14	122	0.96	194	1.41	275	15.03	252	4.61	1066
No	1.21	41	35.67	70	0.96	74	53.59	38	48.46	98	35.30	327
Total	1.30	229	14.51	194	0.96	275	11.31	322	26.45	360	12.85	1700
Interaction	*F*		0.554	*Sig. of F*		0.696						
1992/93												
Yes	4.03	203	21.41	132	16.16	222	46.60	311	38.38	278	27.52	1193
No	0.85	41	1.05	66	0.91	74	50.09	47	21.34	102	16.49	338
Total	3.17	256	13.94	204	13.22	308	46.44	367	31.56	389	23.95	1700
Interaction	*F*		0.472	*Sig. of F*		0.765						
1993/94												
Yes	36.69	197	35.06	130	41.37	218	43.24	295	18.14	273	32.65	1171
No	0.98	52	1.12	68	59.68	75	1.37	43	1.31	107	20.38	357
Total	27.61	255	23.13	202	44.72	301	34.80	350	13.13	386	29.24	1700
Interaction	*F*		0.363	*Sig. of F*		0.835						
1994/95												
Yes	14.36	195	38.71	132	1.31	203	23.66	306	10.06	251	18.25	1149
No	1.04	40	1.14	69	46.99	72	1.25	45	22.01	89	15.35	319
Total	11.37	262	24.29	214	12.00	290	19.90	366	13.13	362	17.01	1700
Interaction	*F*		0.381	*Sig. of F*		0.822						

Table A6.8 Change in market extension. Industry sector and family enterprise

Interval	*Industry sector*											
Family	*TEXT*		*ELEC*		*FOOD*		*WOOD*		*MECH*		*Total*	
enter-prise	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*
1991/92												
Yes	8.00	180	9.11	122	1.86	194	3.69	275	6.26	252	5.06	1066
No	10.36	41	15.02	70	7.10	74	6.07	38	14.51	98	10.87	327
Total	8.80	229	11.19	194	3.36	275	4.10	322	8.39	360	5.93	1700
Interaction	*F*		0.453	*Sig. of F*		0.771						
1992/93												
Yes	10.58	203	9.04	132	2.78	222	4.37	311	7.76	278	6.26	1193
No	10.80	41	14.01	66	6.17	74	4.70	47	15.73	102	10.80	338
Total	10.24	256	10.69	204	3.70	308	4.61	367	9.88	389	7.04	1700
Interaction	*F*		0.877	*Sig. of F*		0.477						
1993/94												
Yes	11.25	197	9.54	130	3.49	218	4.59	295	6.78	273	6.29	1171
No	12.23	52	15.93	68	5.97	75	5.28	43	15.52	107	11.42	357
Total	11.29	255	11.55	202	4.27	301	4.73	350	9.00	386	7.12	1700
Interaction	*F*		2.053	*Sig. of F*		0.086						
1994/95												
Yes	10.69	195	9.63	132	6.06	203	6.08	306	7.60	251	7.36	1149
No	11.08	40	17.23	69	6.67	72	5.04	45	16.50	89	11.82	319
Total	10.63	262	12.53	214	6.32	290	5.97	366	10.19	362	8.07	1700
Interaction	*F*		4.145	*Sig. of F*		0.003						

It is not the purpose of this thesis to investigate these interactions fully. The purpose is merely to justify selection and combination of variables to be included in the final path analysis.

Based on a total evaluation of the above tables the interaction between the metric and the categorical exogenous variables (*industry sector*, *family ownership*, and *region)* will be analysed independently. The combined effect of interaction of these three categorical variables plus the metric variables cannot be investigated since the number of cases for several combinations will be too small for the statistical analyses.

A.6,2 LISREL Path Analysis

The LISREL path analysis can be used to perform a multivariate regression whereby the (strength of) relationship between a set of exogenous variables, x-values, and a set of effects, y-variable(s) can be established (Jöreskog and Sörbom, 1993: 144).

The path analysis, as in all other LISREL modules, is based on the analysis of correlation or covariance coefficients. The focal point of the analysis is the influence of exogenous factors on export orientation. Since we are focusing on the dynamic aspects, the actual measures of export orientation will be:

Change in export quotas defined as:

$$(\text{Change in export quotas})_{i,j} = (\text{Export quotas})_j/(\text{Export quotas})_i$$

and change in market extension defined as:

$$(\text{Change in market extension})_{i,j} = (\text{Market extension})_j/(\text{Market extension})_i$$

Initial correlation table

Correlation between all exogenous variables and factors on the one hand and these two measures of export orientation on the other are given in Table A6.9. This initial correlation table is used to identify variables/factors with a low correlation to both measures of export orientation. As can be clearly seen from the table, the general picture of low correlation coefficients is the same as found when performing the factor analyses described in Chapter 7 and Appendix 5.

Variables/factors with correlation coefficients larger than 0.1 are indicated by bold print. The variables included in the path analysis are also in bold print.

Table A6.9 Export orientation and potential external factors. Correlation coefficients

	1991/92		*1992/93*		*1993/94*		*1994/95*	
	mexten	*expgr*	*mexten*	*expgr*	*mexten*	*expgr*	*mexten*	*expgr*
	dmrk12	*cexpr12*	*dmrk23*	*cexpr23*	*dmrk34*	*cexpr34*	*dmrk45*	*cexpr45*
***dmrk**$_{ij}$*	1.0000		1.0000		1.0000		1.0000	
N	1110		1076		1044		976	
p	.		.		.		.	
***cexpr**$_{ij}$*	0.0715	1.0000	-0.0014	1.0000	0.0216	1.0000	-0.0142	1.0000
N	392	434	449	498	566	644	569	635
p	0.158	.	0.977	.	0.608	.	0.735	.
***exin**$_{i}$*	**0.4764**	-0.0199	**0.4611**	-0.0535	0.301	**-0.1217**	**0.4149**	-0.0428
N	499	199	440	203	315	224	278	208
p	0.000	0.780	0.000	0.448	.000	0.069	0.000	0.539
es01$_{i}$	-0.0677	-0.0947	-0.0758	0.0224	-0.0458	0.0152	-0.1095	-0.0658
N	584	290	650	345	612	424	636	461
p	0.102	0.107	0.053	0 .679	0.258	0.754	0.006	0.159
es02$_{i}$	0.1066	0.0235	0.0657	-0.0342	-0.0777	0.0474	-0.0225	-0.021
N	584	290	650	345	612	424	636	461
p	.010	.691	.094	.527	.055	.330	.570	.652
es03$_{i}$	-0.096	0.0045	-0.0879	-0.0242	-0.1053	0.0626	-0.1624	-0.0679
N	584	290	650	345	612	424	636	461
p	0.020	0.939	0.025	0.654	0.009	0.198	0.000	0.146
***es04**$_{i}$*	**-0.2676**	-0.0461	**-0.2295**	0.0585	**-0.124**	0.0117	**-0.2002**	-0.0507
N	584	290	650	345	612	424	636	461
p	0.000	0.434	0.000	0.279	0.002	0.809	0.000	0.277
es05$_{i}$	-0.0286	-0.0403	-0.0243	-0.048	-0.0548	-0.0694	-0.0352	**-0.1294**
N	584	290	650	345	612	424	636	461
p	0.490	0.494	0.537	0.374	0.176	0.154	0.375	0.005
es06$_{i}$	-0.0471	0.008	-0.0809	0.0551	-0.0685	0.0385	**-0.1593**	-0.0696
N	584	290	650	345	612	424	636	461
p	0.256	0.892	0.039	0.307	0.090	0.429	0.000	0.136

Cont./

Table A6.9 Export orientation and potential external factors. Correlation coefficients. /Cont

	1991/92		1992/93		1993/94		1994/95	
	dmrk12	*cexpr12*	*dmrk23*	*cexpr23*	*dmrk34*	*cexpr34*	*dmrk45*	*cexpr45*
$es07_i$	**-0.1295**	-0.0094	-0.0534	0.0789	-0.06	0.0215	-0.0521	-0.0599
N	584	290	650	345	612	424	636	461
p	0.002	0.874	0.174	0.143	0.138	0.659	0.190	0.199
$es08_i$	-0.0046	-0.0218	0.0067	0.0914	0.0626	0.0022	0.0327	-0.0388
N	584	290	650	345	612	424	636	461
p	0.912	0.711	0.864	0.090	0.122	0.964	0.410	0.406
$\mathbf{es09_i}$	**-0.2023**	-0.0373	**-0.1763**	0.0958	**-0.181**	0.0468	**-0.2148**	-0.0968
N	584	290	650	345	612	424	636	461
p	0.000	0.527	0.000	0.076	0.000	0.336	0.000	0.038
$\mathbf{spc_i}$	**-0.2006**	-0.0402	**-0.1685**	0.1384	**-0.1485**	0.0388	**-0.1621**	0.0509
N	433	194	501	240	513	337	484	332
p	0.000	0.578	0.000	0.032	0.001	0.477	0.000	0.355
$\mathbf{v407_i}$	**-0.4309**	-0.0684	**-0.4482**	0.0525	**-0.3985**	-0.0301	**-0.4033**	0.0098
N	774	346	774	380	789	530	734	519
p	0.000	0.204	0.000	0.308	0.000	0.489	0.000	0.824
$v901_i$	**0.1101**	-0.0358	0.07	0.0467	0.0836	-0.0357	0.0755	-0.0448
N	937	403	969	474	819	546	842	584
p	0.001	0.473	0.029	0.311	0.017	0.405	0.028	0.279
$\mathbf{v912_i}$	**-0.3355**	-0.0379	**-0.2646**	0.0271	**-0.1688**	0.0702	**-0.2097**	-0.0263
N	965	422	1000	488	894	597	889	610
p	0.000	0.438	0.000	0.550	0.000	0.087	0.000	0.517
$v913_i$	0.0512	-0.0117	0.0971	-0.0164	0.0418	0.0385	0.11	-0.0951
N	974	423	1005	491	956	628	898	617
p	0.110	0.810	0.002	0.717	0.197	0.335	0.001	0.018
$v914_i$	**-0.1022**	-0.0288	-0.0964	0.0053	-0.085	0.0102	-0.0494	-0.0309
N	978	429	1000	488	953	625	894	614
p	0.001	0.551	0.002	0.907	0.009	0.800	0.140	0.445
$v915_i$	0.0486	0.0143	0.0729	0.0061	0.2368	0.0328	0.0773	-0.0192
N	967	422	992	487	844	556	895	616
p	0.131	0.769	0.022	0.893	0.000	0.440	0.021	0.634

Cont./

Table A6.9 Export orientation and potential external factors. Correlation coefficients. /Cont

	1991/92		1992/93		1993/94		1994/95	
	dmrk12	*cexpr12*	*dmrk23*	*cexpr23*	*dmrk34*	*cexpr34*	*dmrk45*	*cexpr45*
$v916_i$	-0.0104	0.025	-0.0168	0.0924	-0.0145	-0.0328	0.0291	0.0231
N	965	417	1006	490	974	631	887	608
p	0.748	0.610	0.594	0.041	0.651	0.411	0.387	0.570
$ent9_ia1$	-0.093	-0.063	-0.1615	0.032	-0.0771	-0.0811	0.0056	0.0061
N	549	283	600	341	461	341	545	400
p	0.029	0.291	0.000	0.556	0.098	0.135	0.896	0.904
$ent9_ia2$	**0.3374**	0.0649	**0.3125**	0.0091	**0.3305**	-0.0479	**0.3573**	-0.0309
N	549	283	600	341	461	341	545	400
p	0.000	0.276	0.000	0.867	0.000	0.378	0.000	0.538
$ent9_ib1$	**-0.2395**	0.0067	**-0.1739**	0.0569	**-0.2028**	0.0137	**-0.1781**	0.0744
N	549	283	600	341	461	341	545	400
p	0.000	0.911	0.000	0.295	0.000	0.802	0.000	0.138
$ent9_ib2$	-0.0252	-0.0889	-0.0516	0.0491	0.0597	-0.1056	-0.0718	0.0422
N	549	283	600	341	461	341	545	400
p	0.555	0.136	0.207	0.366	0.201	0.051	0.094	0.400

The delimiting value of 0.1 for including variables in further analyses is very low. There is very little reason to assume that any of the variables thus excluded will have any significant influence on the export orientation measures.

Correlation coefficients between included variables and export orientation measures are all significant. However, with this high number of observations, statistical significance is not a good indicator.

Intermediate correlation tables

The complete tables of correlation coefficients, which will be used in the path analysis, are given in Table A6.10. This table is the result of eliminating variables and factors in Table A6.9 with correlation coefficients lower than 0.1. The coefficients found in Table A6.10 are identical to similar the coefficients in Table A6.9.

The number of cases included in the model (N) is used for the calculation of goodness of fit. Due to the large number of variables, listwise deletion of cases would reduce the number of cases available for the path analysis to

only 45, thus severely reducing the information available to the analysis, and thereby also reducing the external validity. The consequence is reduced reliability of the analysis. Therefore pairwise deletion of cases has been selected for the correlation analysis, resulting in a different number of observed cases for each pair of variables. The number of cases used in the path analysis (N) is arbitrarily chosen as the average of the highest and lowest number of observations for all pairs of variables within each correlation matrix.

Table A6.10 Input to intermediate model. Correlation coefficients.

	mex-ten	*expgr*	*exin*	*supl*	*cpac*	*prod*	*empl*	*spec*	*locs*	*educ*	*fmgr*	*capab*	*stab*
1991/92													
N=775													
dmrk12	1.000												
cexpr12	.072	1.000											
exin1	**.476**	-.020	1.000										
es031	-.096	.005	-.181	1.000									
es041	-.268	-.046	-.279	-.005	1.000								
es091	-.202	-.037	-.245	.150	.298	1.000							
emp1	.287	.010	.229	.039	-.163	-.104	1.000						
spc1	-.201	-.040	-.254	.036	.020	.015	-.175	1.000					
v4071	**-.431**	-.068	**-.451**	.074	.235	.169	-.130	.134	1.000				
v9011	.110	-.036	.088	.007	-.078	-.043	-.008	-.065	-.071	1.000			
v9121	**-.336**	-.038	-.332	.051	.242	.112	-.178	.124	.313	-.105	1.000		
ent91a2	**.337**	.065	.375	-.089	-.201	-.135	.177	-.156	-.289	.236	-.280	1.000	
ent91b1	-.240	.007	-.223	-.150	.113	.093	-.150	.035	.164	-.094	.424	-.254	1.000
1992/93													
N=848													
dmrk23	1.000												
cexpr23	-.001	1.000											
exin2	**.461**	-.054	1.000										
es032	-.088	-.024	-.152	1.000									
es042	-.230	.059	**-.338**	-.001	1.000								
es092	-.176	.096	**-.314**	.225	.299	1.000							
emp2	.176	-.064	.247	.028	-.136	-.008	1.000						
spc2	-.169	.138	-.174	-.100	.065	.050	-.100	1.000					
v4072	**-.448**	.053	-.481	.079	.251	.120	-.206	.087	1.000				
v9012	.070	.047	.108	.031	-.071	-.006	.020	-.094	-.068	1.000			
v9122	-.265	.027	**-.352**	.013	.220	.049	-.153	.101	.290	-.107	1.000		
ent92a2	**.313**	.009	**.353**	-.070	-.118	-.087	.137	-.149	**-.309**	.226	-.255	1.000	
ent92b1	-.174	.057	-.211	-.074	.139	.023	-.142	.139	.166	-.085	.298	-.214	1.000

Cont/.

Table A6.10 Input to intermediate model. Correlation coefficients /Cont.

	mexten	*expgr*	*exin*	*supl*	*cpac*	*prod*	*empl*	*spec*	*locs*	*educ*	*fmgr*	*capab*	*stab*
1993/94													
N=790													
dmrk34	1.000												
cexpr34	.022	1.000											
exin3	**.301**	-.122	1.000										
es033	-.105	.063	-.087	1.000									
es043	-.124	.012	-.171	-.014	1.000								
es093	-.181	.047	-.096	.179	.335	1.000							
emp3	.178	.033	.200	.057	-.095	-.094	1.000						
spc3	-.149	.039	-.191	-.003	.013	.047	-.181	1.000					
v4073	**-.399**	-.030	**-.393**	.067	.198	.115	-.189	.221	1.000				
v9013	.084	-.036	.097	.000	.021	.017	-.022	-.026	-.100	1.000			
v9123	-.169	.070	-.252	.039	.099	.039	-.102	.071	.242	-.092	1.000		
ent93a2	**.331**	-.048	.275	-.029	-.107	-.034	.103	-.129	-.280	.205	-.182	1.000	
ent93b1	-.203	.014	-.173	.005	.178	.065	-.130	.112	.227	-.062	.276	-.222	1.000
1994/95													
N=819													
dmrk45	1.000												
cexpr45	-.014	1.000											
exin4	**.415**	-.043	1.000										
es034	-.162	-.068	-.129	1.000									
es044	-.200	-.051	-.198	.002	1.000								
es094	-.215	-.097	-.237	.196	**.316**	1.000							
emp4	**.327**	-.037	**.373**	-.030	-.168	-.109	1.000						
spc4	-.162	.051	-.203	.029	.079	.054	-.209	1.000					
v4074	**-.403**	.010	**-.528**	.070	.257	.169	-.279	.223	1.000				
v9014	.076	-.045	.149	-.023	-.044	-.022	.113	-.070	-.052	1.000			
v9124	-.210	-.026	**-.347**	.002	.144	.017	-.249	.187	.293	-.126	1.000		
ent94a2	**.357**	-.031	**.502**	-.064	-.114	-.093	.283	-.204	**-.347**	.226	-.298	1.000	
ent94b1	-.178	.074	-.290	-.084	.073	.093	-.230	.084	.204	-.122	**.351**	**-.301**	1.000

Correlation factors with value 0.3 or higher are indicated in bold print. The low number of such incidences indicates that it will be difficult to find a good path model.

Final path analysis

The purpose of the final path analysis is to identify and investigate the stability of a regression model for export orientation. The selection of exogenous variables, which is indicated in Table 8.1, includes all variables which may potentially have significant effect on the endogenous variables. In addition the variables: *capacity*, *specialisation*, and *education* are included to verify that they have no significant effect on export orientation.

Table A6.11 Input to final path model. Correlation coefficients

	$dmrk_{ij}$	$cexpr_{ij}$	$exin_i$	$es04_i$	emp_i	spc_i	$v407_i$	$v901_i$	$ent9_ia2$
	mexten	*expgr*	*exin*	*cpac*	*empl*	*spec*	*locs*	*educ*	*cpabab*
1991/92									
N=754									
dmrk12	1.000								
cexpr12	0.072	1.000							
exin1	0.476	-0.020	1.000						
es041	-0.268	-0.046	-0.279	1.000					
emp1	0.287	0.010	0.229	-0.163	1.000				
spc1	-0.201	-0.040	-0.254	0.020	-0.175	1.000			
v4071	-0.431	-0.068	-0.451	0.235	-0.130	0.134	1.000		
v9011	0.110	-0.036	0.088	-0.078	-0.008	-0.065	-0.071	1.000	
ent91a2	0.337	0.065	0.375	-0.201	0.177	-0.156	-0.289	0.236	1.000

Cont./

Table A6.11 Input to final path model. Correlation coefficients /Cont.

	$dmrk_{ij}$ *mexten*	$cexpr_{ij}$ *expgr*	$exin_i$ *exin*	$es04_i$ *cpac*	emp_i *empl*	spc_i *spec*	$v407_i$ *locs*	$v901_i$ *educ*	$ent9_ia2$ *cpabab*
1992/93									
N=832									
dmrk23	1.000								
cexpr23	-0.001	1.000							
exin2	0.461	-0.054	1.000						
es042	-0.230	0.059	-0.338	1.000					
emp2	0.176	-0.064	0.247	-0.136	1.000				
spc2	-0.169	0.138	-0.174	0.065	-0.100	1.000			
v4072	-0.448	0.053	-0.481	0.251	-0.206	0.087	1.000		
v9012	0.070	0.047	0.108	-0.071	.020	-0.094	-0.068	1.000	
ent92a2	0.313	0.009	0.353	-0.118	.137	-0.149	-0.309	0.226	1.000
1993/94									
N=736									
dmrk34	1.000								
cexpr34	0.022	1.000							
exin3	0.301	-0.122	1.000						
es043	-0.124	0.012	-0.171	1.000					
emp3	0.178	0.033	0.200	-0.095	1.000				
spc3	-0.149	0.039	-0.191	0.013	-0.181	1.000			
v4073	-0.399	-0.030	-0.393	0.198	-0.189	0.221	1.000		
v9013	0.084	-0.036	0.097	0.021	-0.022	-0.026	-0.100	1.000	
ent93a2	0.331	-0.048	0.275	-0.107	0.103	-0129	-0.280	0.205	1.000

Cont./

Table A6.11 Input to final path model. Correlation coefficients /Cont.

	$dmrk_{ij}$ *mexten*	$cexpr_{ij}$ *expgr*	$exin_i$ *exin*	$es04_i$ *cpac*	emp_i *empl*	spc_i *spec*	$v407_i$ *locs*	$v901_i$ *educ*	$ent9_ia2$ *cpabab*
1994/95									
N=777									
dmrk45	1.000								
cexpr45	-0.014	1.000							
exin4	0.415	-0.043	1.000						
es044	-0.200	-0.051	-0.198	1.000					
emp4	0.327	-0.037	0.373	-0.168	1.000				
spc4	-0.162	0.051	-0.203	0.079	-0.209	1.000			
v4074	-0.403	0.010	-0.528	0.257	-0.279	0.223	1.000		
v9014	0.076	-0.045	0.149	-0.044	0.113	-0.070	-0.052	1.000	
ent94a2	0.357	-0.031	0.502	-0.114	0.283	-0.204	-0.347	0.226	1.000

Family ownership of enterprises

Correlation matrices for this and following sections are available from author on request.

Table A6.12 Market extension and family ownership

		1991/92		*1992/93*		*1993/94*		*1994/95*	
		Family	*Non-family*	*Family*	*Non-family*	*Family*	*Non-family*	*Family*	*Non-family*
exin	γ	0.33	0.32	0.32	0.45	0.13	0.34	0.27	0.15
	t	7.93	4.69	7.90	6.53	2.96	4.75	6.01	1.4
cpac	γ	-0.16	-0.07	-0.11		-0.08		-0.06	-0.21
	t	-3.99	-1.10	-2.82		-2.04		-1.56	-2.97
empl	γ	0.11	0.21	0.05		0.12		0.16	0.19
	t	2.90	3.15	1.37		3.05		4.11	2.59
spec	γ		-0.12	-0.08		-0.07	-0.09	-0.05	0.09
	t		-1.75	-2.25		-1.67	-1.27	-1.38	1.34
educ	γ		0.12	-0.04			0.10	-0.05	
	t		1.75	-1.05			1.37	-1.38	
capab	γ	0.11	0.15	0.17	0.14	0.30	0.12	0.14	0.29
	t	2.83	22.12	4.29	2.07	7.51	1.63	3.11	2.60
expgr	β	-0.08	0.28	0.05			0.37		
	t	-1.69	3.38	1.33			5.11		
Expl. var		0.25	0.30	0.24	0.25	0.18	0.18	0.22	0.30
N cases		559	176	622	188	553	176	584	159
Model fit		+++	+++	+++	+++	+++	+++	+++	+++

There is no consistency over time in the path models of change in market extension nor in change in export quota, see A6.13, and family ownership. No stable pattern of interaction can be identified for the factor family ownership.

Table A6.13 Export quota and family ownership

		1991/92		1992/93		1993/94		1994/95	
		Family	*Non-family*	*Family*	*Non-family*	*Family*	*Non-family*	*Family*	*Non-family*
exin	γ	0.08	-0.20		0.05	-0.10	-0.30	0.04	-0.32
	t	1.65	-2.45		0.68	-2.21	-4.27	0.84	-4.10
cpac	γ	-0.10		0.06	0.12		0.18	-0.07	
	t	-2.32		1.38	1.52		2.73	-1.70	
empl	γ	-0.09					0.24		
	t	-2.06					3.61		
spec	γ	-0.23	0.15	0.20		0.06	-0.13	0.08	
	t	-5.35	1.95	5.01		1.42	-1.95	2.00	
educ	γ	-0.10	-0.09	0.06			-0.15	-0.08	
	t	-2.35	-1.22	1.45			-2.14	-1.94	
capab	γ						-0.14		0.20
	t						-1.94		2.60
mexten	β	0.08	-0.28	-0.05			-0.37		
	t	1.69	-3.38	-1.33			-5.11		
Expl. var		0.08	0.09	0.04	0.01	0.02	0.28	0.02	0.11
N cases		559	176	622	188	553	176	584	159
Model fit		+++	+++	+++	+++	+++	+++	+++	+++

Location of enterprises

As explained in section 7.6, the location variable has been recoded from national level to regional level with three values: Central (Austria and Switzerland), BeNe (Belgium and the Netherlands), and Nord (Finland, Norway, and Sweden). Nevertheless, the number of observed cases is very low for the BeNe category. The results of the analyses are therefore not reliable for all intervals and can only be indicative for this category.

Table A6.14 Effect of location of enterprises

		1991/92			1992/93			1993/94			1994/95		
		Centr	BeNe	Nord	Centr	BeNe	Nord	Centr	BeNe	Nord	Centr	BeNe	Nord
Market extension													
exin	γ	0.44	0.62	0.31	0.35	0.42	0.32	0.07	1.01	0.28	0.20	1.05	0.19
	t	8.67	5.10	6.70	6.90	2.58	5.97	1.38	6.68	5.18	4.11	3.44	3.79
cpac	γ		-0.37	-0.15	-0.09		-.07		0.52	-0.12	-0.11		-0.24
	t		-3.09	-3.32	-1.94		-1.30		4.23	-2.45	-2.41		-4.98
empl	γ	0.12		0.12	0.16			0.31	0.27		0.30		0.15
	t	2.50		2.62	3.27			5.71	2.63		6.14		3.06
spec	γ		0.36				-0.06		0.60	-0.09			-0.17
	t		3.01				-1.21		5.37	-1.79			-3.37
educ	γ		0.33	0.07				-0.09		0.08		0.73	0.07
	t		2.60	1.54				-1.83		1.60		2.49	1.34
capab	γ	0.09	-0.23	0.19	0.08		0.20	0.22	-0.08	0.14		-0.45	0.16
	t	1.91	-1.69	3.89	1.71		3.79	4.01	-0.72	2.78		-1.46	3.02
Expl.var		0.29	0.56	0.27	0.26	0.18	0.22	0.22	0.77	0.17	0.21	0.60	0.30
Export quota													
exin	γ	-0.43					-0.13			-0.31		-2.48	
	t	-7.68					-2.24			-5.64		-2.82	
cpac	γ	-0.08	-0.44			0.30		0.05		0.07		0.26	-0.09
	t	-1.60	-2.90			1.82		0.93		1.40		1.28	-1.68
empl	γ				-0.09			-0.09		0.08		0.58	-0.05
	t				-1.86			-1.46		1.55		1.83	-0.96
spec	γ	0.31	0.20	0.06	-0.18	0.18	0.24		-0.16		0.10		
	t	-6.82	1.35	1.14	-3.79	1.07	4.37		-1.01		2.07		
educ	γ			-0.08	0.08	0.26	0.07		-0.55			-2.29	-0.05
	t			-1.57	1.68	1.32	1.37		-3.63			-3.21	-0.93
capab	γ	0.36	-0.31		0.21	-0.39		0.06	-0.18			1.27	
	t	7.32	-2.70		4.26	-1.97		1.05	-1.20			2.18	
Expl.var		0.28	0.32	0.02	0.08	0.21	0.09	0.03	0.35	0.08	0.01	1.41	0.01
Expgrx mexten	β	0.17	-0.42	0.10			0.19	0.18		0.10		0.87	
	t	3.19	-2.81	1.99			3.27	2.89		1.82		1.89	
N cases		367	43	390	415	41	337	337	38	366	414	30	332
Model fit		+++	+++	+++	+++	--	+++	+++	-	+++	+++	---	+++

Industry sectors and export orientation

Table A6.15 Effect of industry sectors; 1991/92

		TEXT	*ELEC*	*FOOD*	*WOOD*	*MECH*
Market extension						
exin	γ	0.43	0.16	0.16	0.31	0.15
	t	5.33	1.53	1.76	3.79	2.12
cpac	γ				-0.11	-0.08
	t				-1.56	-1.13
empl	γ	0.26			0.09	
	t	3.25			1.30	
spec	γ				-0.12	
	t				-1.76	
educ	γ	0.15	0.12	0.12		0.12
	t	1.90	1.25	1.44		1.70
capab	β		0.18	0.18	0.22	0.18
	t		1.73	1.98	3.23	2.39
Expl. var		0.32	0.10	0.10	0.35	0.11
Export quota						
exin	γ	0.19	-0.61	-0.61	0.22	-0.61
	t	1.64	-6.87	-7.87	2.18	-9.54
cpac	γ				0.15	
	t				1.82	
empl	γ		0.20	0.20	-0.13	0.20
	t		2.34	2.68	-1.63	3.25
spec	γ	-0.19			-0.14	
	t	-1.73			-1.94	
educ	γ	0.13			-0.24	
	t	1.29			-3.21	
capab	γ	-0.26	0.45	0.45	0.28	0.45
	t	-2.57	5.23	5.99	3.46	7.26
Expl. var		0.11	0.36	0.36	0.17	0.36
expgr x	β	-.16			-.13	
mexten	*t*	-1.58			-1.50	
N cases		118	106	137	171	198
Model fit		+++	+++	+++	+++	+++

Table A6.16 Effect of industry sectors; 1992/93

		TEXT	*ELEC*	*FOOD*	*WOOD*	*MECH*
Market extension						
exin	γ	0.52		0.57	0.24	0.34
	t	6.26		8.54	3.67	5.48
cpac	γ		-0.26	-0.08	-0.14	
	t		-2.80	-1.23	-2.25	
empl	γ	-0.13	0.10	0.10		
	t	-1.63	1.04	1-58		
spec	γ			0.09	-0.29	
	t			1.35	-4.73	
educ	γ	0.11			-0.09	
	t	1.46			-1.50	
capab	γ		0.21		0.29	0.30
	t		2.30		4.41	4.74
Expl. var		0.26	0.13	0.39	0.32	0.28
Export quota						
exin	γ	0.14	0.27	-0.39		-0.11
	t	1.38	2.95	-3.96		-1.38
cpac	γ					0.09
	t					1.24
empl	γ	0.35			-0.09	
	t	4.17			-1.19	
spec	γ		0.45	-0.09	0.07	
	t		5.04	-1.18	1.00	
educ	γ		-0.11			0.28
	t		-1.25			4.23
capab	γ	0.17				-0.10
	t	2.02				-1.48
Expl. var		0.22	0.22	0.39	0.01	0.11
expgr x	β	-0.14		0.27		
mexten	*t*	-1.56		2.78		
N cases		135	113	160	189	220
Model fit		+++	+++	+++	+++	+++

Table A6.17 Effect of industry sectors; 1993/94

		TEXT	*ELEC*	*FOOD*	*WOOD*	*MECH*
Market extension						
exin	γ			0.41	0.24	0.14
	t			5.11	3.47	1.95
cpac	γ			-0.09		
	t			-1.12		
empl	γ	0.17		0.12	0.15	0.11
	t	1.82		1.58	2.26	1.47
spec	γ	-0.16				
	t	-1.70				
educ	γ		0.16	0.11		
	t		1.54	1.47		
capab	γ	0.22	0.25		0.41	0.26
	t		2.43		5.92	3.69
Expl. var		0.13	0.09	0.25	0.29	0.13
Export quota						
exin	γ	-0.45	-0.32		0.18	-0.33
	t	-4.72	-3.08		2.21	-4.62
cpac	γ	0.08	-0.13			0.10
	t	0.99	-1.27			1.51
empl	γ			0.24	0.09	
	t			2.99	1.14	
spec	γ			-0.25	0.15	
	t			-3.18	1.81	
educ	γ	-0.31	0.10	0.27	-0.12	
	t	-3.53	0.93	3.45	-1.55	
capab	γ	0.53		-0.14	0.16	
	t	5.32		-1.76	1.79	
Expl. var		0.27	0.12	0.24	0.08	0.18
expgr x mexten	β	-0.13			-0.10	0.31
	t	1.37			-1.08	4.51
N cases		114	96	136	164	193
Model fit		+++	+++	+++	+++	+++

Table A6.18 Effect of industry sectors; 1994/95

		TEXT	*ELEC*	*FOOD*	*WOOD*	*MECH*
Market extension						
exin	γ	0.12	0.35		0.24	0.23
	t	1.12	4.11		3.21	3.15
cpac	γ		-0.10			-0.14
	t		-1.26			-2.16
empl	γ	0.26		0.33	0.23	0.13
	t	2.56		4.40	3.39	1.95
spec	γ	-0.14	0.11	0.09		-0.19
	t	-1.49	1.34	1.27		-3.00
educ	γ		-0.12			0.08
	t		-1.40			1.34
capab	γ		0.26	0.35	0.19	0.24
	t		3.17	4.79	2.53	3.35
Expl. var		0.16	0.21	0.27	0.26	.39
Export quota						
exin	γ		-0.34	-0.46		-0.40
	t		-3.74	-4.80		-4.56
cpac	γ	-0.19		0.19	-0.07	-0.15
	t	-2.03		2.39	-0.87	-1.97
empl	γ		0.08	0.25		
	t		0.96	2.67		
spec	γ	0.13			0.19	
	t	1.41			2.53	
educ	γ	-0.23				
	t	-2.48				
capab	γ			0.19		0.28
	t			2.07		3.48
Expl. var		0.09	0.09	0.27	0.03	0.11
expgr $x\beta$			0.10			
mexten t			1.20			
N cases		117	142	144	189	186
Model fit		+++	+++	+++	+++	+++

A.6.2 Total performance

Export regularity

Export quota

Change rates of export quota are very closely related to the definitions and procedures for classification of change patterns, see Appendix 4. Assessing influence of changes in export quota on export regularity, see Figure 4.4, would therefore be tautological. In Tables A6.19 and A6.20 the relationship between the absolute level of export quota each year and the export regularity pattern assessed over the 5-year period is explored.

Table A6.19 Export regularity and average value of export quota

	1991		*1992*		*1993*		*1994*		*1995*	
s=0.2	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*
Incr growth	116	0.249	116	0.296	116	0.367	116	0.382	116	0.445
Stable	79	0.716	79	0.633	79	.0637	79	0.667	79	0.643
Incr decline	36	0.364	36	0.328	36	0.316	36	0.261	36	0.208
Irregular	144	0.234	144	0.212	144	0.226	144	0.252	144	0.219
Intermittent	40	0.044	40	0.088	40	0.089	40	0.091	40	0.159
Exporters total	415	0.260	415	0.252	415	0.273	415	0.281	415	0.286
Non-exporter	319	0	319	0	319	0	319	0	319	0
Missing cat.	966		966		966		966		966	
Table total	1700	0186	1700	0.209	1700	0.197	1700	0.205	1700	0.213

There are identical groups of enterprises each year. Uniformly increasing average values for the incremental growth category and uniformly decreasing average values for the incremental decline category validate the definition of these categories. The yearly fluctuations of averages for the stable category are less than 13%. The similar maximum yearly fluctuation for the irregular category is 15% and 100% for the intermittent category. For all of the last three categories, aggregate effects of random independent fluctuations at enterprise level must be further analysed before claiming or disclaiming support for the categorisation.

Table A6.20 Export regularity and level export quota . Analysis of variance

Variable	EXPRi	Export rate i (year)			
By Variable	EMOD	2nd ORDER CHANGE PATTERN			
s=0.2	Exporters only				SPSS
	D.F.	*Sum of Squares*	*Mean Squares*	*F Ratio*	*F Prob.*
1991					
Between Groups	4	13.0440	3.2610	75.2274	0.000
Within Groups	323	14.0016	0.0433		
Total	327	27.0456			
1992					
Between Groups	4	9.6390	2.4098	40.9648	0.000
Within Groups	348	20.4711	0.0588		
Total	352	30.1101			
1993					
Between Groups	4	10.3828	2.5957	45.9480	0.000
Within Groups	369	20.8456	0.0565		
Total	373	31.2284			
1994					
Between Groups	4	11.1554	2.7888	46.3527	0.000
Within Groups	368	22.1410	0.0602		
Total	372	33.2963			
1995					
Between Groups	4	11.1531	2.7883	23.2542	0.000
Within Groups	369	44.2448	0.1199		
Total	373	55.3979			

The differences between export quotas in the categories of exporters are statistically significant for each year. Stable exporters have consistently the highest export quotas and intermittent exporters consistently the lowest export quotas, followed by irregular exporters. Consistency is found in conjunction with high levels of exporting.

Market extension

The relationship between export regularity and average change rates in the index of market extension is explored in Tables A6.24 and A6.25.

Table A6.21 Export regularity and average values of market extension.

	1991-92		*1992-93*		*1993-94*		*1994-95*	
s=0.2	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*
Incr growth	116	15.730	116	19.270	116	17.700	116	16.300
Stable	79	24.080	79	21.540	79	25.410	79	27.890
Incr decline	36	12.190	36	8.940	36	12.760	36	14.940
Irregular	144	11.350	144	12.260	144	12.460	144	15.120
Intermittent	40	2.946	40	3.259	40	1.799	40	3.062
Exporters total	415	14.260	415	14.830	415	15.388	415	16.703
Non-exporter	319	0	319	0	319	0	319	0
Missing cat.	966		966		966		966	
Table total	1700	5.925	1700	7.04	1700	7.122	1700	8.069

Once again the differences in change rates between the categories of exporters are found to be statistically significant for all intervals.

Highest change rates are consistently found for the *stable* category, followed by the *incremental growth* category. Lowest change rates are consistently found in the *intermittent* category.

Table A6.22 Export regularity and average values of market extension. Analysis of variance.

Variable	$DMRK_{i-1,I}$	Market extension i-1 → i (year)			
By Variable	EMOD	2nd order change pattern			
s=0.2	Exporters only				SPSS
	D.F.	*Sum of Squares*	*Mean Squares*	*F Ratio*	*F Prob.*
1991-92					
Between Groups	4	9040.6842	2260.1710	11.4326	0.000
Within Groups	281	55552.1316	197.6944		
Total	285	64592.8158			
1992-93					
Between Groups	4	9659.3982	2414.8496	9.9794	0.000
Within Groups	309	74773.0851	241.9841		
Total	313	84432.4833			
1993-94					
Between Groups	4	11612.9274	2903.2318	9.5917	0.000
Within Groups	285	86264.5337	302.6826		
Total	289	97877.4611			
1994-95					
Between Groups	4	12389.8642	3097.4661	8.9789	0.000
Within Groups	299	103147.0740	344.9735		
Total	303	115536.9382			

Total sales

The dependent variable, change in total sales, as well as the independent variables, change in export sales quota and change in market extension, are all ratio scale variables. This allows using ordinary regression analysis for exploring dependencies. The main features of the SPSS print-outs are reproduced below.

REGRESSION: $SALR_{i-1,i} = \alpha + \beta_1 * CEXPR_{i-1,i} + \beta_2 * DMRK_{i-1,i}$

M U L T I P L E R E G R E S S I O

Pairwise Deletion of Missing Data

1991-92

Table A6.23a Statistics of regression analysis for 1991-92

	Mean	*Std Dev*	*Cases*	*Label*
SALR12	1.130	1.830	597	CH SALE91/92
CEXPR12	12.846	106.718	434	CH EXP QUOTA 91/2
DMRK12	5.925	11.210	1110	MARK EXPANS 91/92

Multiple R	0.43253	*Analysis of Variance*			
R Square	0 .18708		*DF*	*Sum of Squares*	*Mean Square*
Adjusted R Square	0.18290	*Regression*	2	244.86096	122.43048
Standard Error	1.65383	*Residual*	389	1063.97532	2.73516
Cases N=	392	*F =*	44.76181	*Signif F =*	0.0000

Table A6.23b Variables for the regression equation 1991-92

Variable	*B*	*SE-B*	*Beta*	*T*	*Sig-T*
CEXPR12	0.007321	7.8574E-04	0.427049	9.318	0.0000
DMRK12	-0.017241	0.007480	-0.105638	-2.305	0.0217
(Constant)	1.137767	0.088581		12.844	0.0000

1992-93

Table A6.24a Statistics of regression analysis for 1992-93

	Mean	*Std Dev*	*Cases*	*Label*
SALR23	1.166	2.552	704	CH SALE92/93
CEXPR23	23.950	147.128	498	CH EXP QUOTA 92/93
DMRK23	7.040	12.484	1076	MARK EXPANS 92/93

Multiple R	0.27850	*Analysis of Variance*			
R Square	0.07756		*DF*	*Sum of Squares*	*Mean Square*
Adjusted R Square	0.07343	*Regression*	2	226.30694	113.15347
Standard Error	2.45650	*Residual*	446	2691.34732	6.03441
Cases N=	449	*F =*	18.75137	*Signif F =*	0.0000

Table A6.24b Variables for the regression equation 1992-93

Variable	*B*	*SE-B*	*Beta*	*T*	*Sig-T*
CEXPR23	0.004817	7.8883E-04	0.277701	6.106	0.0000
DMRK23	-0.004244	0.009297	-0.020761	-0.457	0.6482
(Constant)	1.080618	0.126522		8.541	0.0000

1993-94

Table A6.25a Statistics of regression analysis for 1993-94

	Mean	*Std Dev*	*Cases*	*Label*	
SALR34	1.104	1.382	942	CH SALE93/94	
CEXPR34	29.239	164.770	644	CH EXP QUOTA 93/94	
DMRK34	7.122	13.599	1044	MARK EXPANS 93/94	
Multiple R	.23256	*Analysis of Variance*			
R Square	.05409		*DF*	*Sum of Squares*	*Mean Square*
Adjusted R Square	.05073	*Regression*	2	58.37029	29.18515
Standard Error	1.34656	*Residual*	563	1020.84610	1.81323
Cases N=	566	*F =*	16.09570	*Signif F =*	0.0000

Table A6.25b Variables for the regression equation 1993-94

Variable	*B*	*SE-B*	*Beta*	*T*	*Sig-T*
CEXPR34	0.001951	3.4389E-04	0.232610	5.674	0.0000
DMRK34	-3.17383E-04	0.004167	-0.003123	-0.076	0.9393
(Constant)	1.049565	0.060067		17.473	0.0000

1994-95

Table A6.26a Statistics of regression analysis for 1994-95

	Mean	*Std Dev*	*Cases*	*Label*
SALR45	1.088	0.520	908	CH SALE94/95
CEXPR45	17.012	124.446	635	CH EXP QUOTA 94/95
DMRK45	8.069	14.927	976	MARK EXPANS 94/95

		Analysis of Variance			
Multiple R	0.23617				
R Square	0.05578		*DF*	*Sum of Squares*	*Mean Square*
Adjusted R Square	0.05244	*Regression*	2	8.55359	4.27680
Standard Error	0.50580	*Residual*	566	144.80356	0.25584
Cases N=	569	*F =*	16.71691	*Signif F =*	0.0000

Table A6.26b Variables for the regression equation 1994-95

Variable	*B*	*SE-B*	*Beta*	*T*	*Sig-T*
CEXPR45	9.39273E-04	1.7056E-04	0.224955	5.507	0.0000
DMRK45	0.002617	0.001422	0.075181	1.841	0.0662
(Constant)	1.050904	0.022767		46.159	0.0000

Total sales and export regularity

Changes in total sales for the various categories of export regularity are depicted in Table A6.27. Table A6.28 is normalised by setting the average change rates for each year to 1.00, thus facilitating identification of categories with diverging growth rates. The effect of this analysis is to eliminate common economic trends and cycles.

When we take all intervals into account, Table A6.27 clearly demonstrates that the enterprises with intermittent export commitment is the only category with consistently different growth rates from the other categories. This category display better performance, measured by growth in total sales, than the other categories.

Table A6.27 Average growth in total sales and categories of export regularity

s=0.2	*1991-92*		*1992-93*		*1993-94*		*1994-95*	
	N	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*
Non-exporter	319	1.033	319	1.024	319	1.068	319	1.090
Incr growth	116	1.263	116	1.004	116	1.031	116	1.121
Stable	79	1.014	79	1.015	79	1.071	79	1.023
Incr decline	36	0.953	36	1.020	36	0.958	36	1.059
Irregular	144	1.022	144	0.986	144	1.075	144	1.092
Intermittent	40	2.281	40	1.365	40	2.305	40	1.331
Total	734	1.130	734	1.166	734	1.104	734	1.088
Category missing	966		966		966		966	
Table Total	1700		1700		1700		1700	

Table A6.28 Normalised growth rates of total sales and categories of export regularity

s=0.2	*1991-92*		*1992-93*		*1993-94*		*1994-95*	
	N	*Mean*	*N*	*Mean*	*N*	*Mean*	*N*	*Mean*
Non-exporter	319	0.914	319	0.878	319	0.967	319	1.002
Incr growth	116	1.117	116	0.861	116	0.934	116	1.030
Stable	79	0.898	79	0.870	79	0.970	79	0.940
Incr decline	36	0.843	36	0.875	36	0.868	36	0.973
Irregular	144	0.905	144	0.846	144	0.974	144	1.004
Intermittent	40	2.019	40	1.171	40	2.088	40	1.223
Total	734	1.000	734	1.000	734	1.000	734	1.000
Category missing	966		966		966		966	
Table Total	1700		1700		1700		1700	

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Summary	The Interstratos project collected longitudinal panel data on strategy for internalisation in small and medium-sized European manufacturing firms over the years 1991-95. This book analyses the dynamic patterns of internationalisation of these firms. Two equally large groups of firms with different dynamic modes have been identified. One is consistent with strategic planning models. The other can be explained with the adaptive features of entrepreneurial models. The dynamic pattern of internationalisation had no effect on total performance.