Foreign Expansion under Uncertainty - 
The Case of Multinational Companies in China

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The President

Prof. Ernst Mohr, PhD
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<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
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<tr>
<td>CFO</td>
<td>Chief Financial Officer</td>
</tr>
<tr>
<td>COGS</td>
<td>Cost of Goods Sold</td>
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<tr>
<td>EBIT</td>
<td>Earnings Before Interest and Taxes</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>GARCH</td>
<td>Generalised Auto-Regressive Conditional Heteroskedasticity</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>HQ</td>
<td>Headquarter</td>
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<tr>
<td>JV</td>
<td>Joint Venture</td>
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<tr>
<td>MLE</td>
<td>Maximum-Likelihood Estimation</td>
</tr>
<tr>
<td>MNC</td>
<td>Multinational Company</td>
</tr>
<tr>
<td>MSCI</td>
<td>Morgan Stanley Capital International</td>
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<tr>
<td>NPV</td>
<td>Net Present Value</td>
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<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
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<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
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<tr>
<td>OTC</td>
<td>Over-The-Counter</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RIS</td>
<td>Relative Investment Size (variable)</td>
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<tr>
<td>ROA</td>
<td>Return on Assets</td>
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<tr>
<td>ROE</td>
<td>Return on Equity</td>
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<tr>
<td>SBU</td>
<td>Strategic Business Unit</td>
</tr>
<tr>
<td>SHA</td>
<td>Initial Shareholding (variable)</td>
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<tr>
<td>TLP</td>
<td>Time-Lagged Performance (variable)</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollar</td>
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<tr>
<td>WFOE</td>
<td>Wholly Foreign-Owned Enterprise</td>
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Acknowledgements

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Dedicated to my parents,
for their love and friendship
Abstract

Corporate expansion in foreign markets with a high degree of uncertainty is a difficult process even for experienced multinational companies. Real options theory provides guidance on how expansion strategies should be structured in such environments. An in-depth longitudinal study of the expansion chronology and strategy of 41 of the largest global manufacturing companies in China reveals that the within-country expansion of market-seeking multinational companies is contingent on exogenous and endogenous uncertainty and that it typically follows a sequential pattern that can be characterised as: Probing, Dispersion and Scaling. The hypotheses are tested within a strategic-options framework, using detailed data from 105 China subsidiaries of manufacturing companies from Europe, North America and Asia. The results show that the level of uncertainty shapes the optimal balance between flexibility and commitment over time. The findings support an options-based approach for foreign expansion under uncertainty, where the creation of a portfolio of subsidiaries is used as a means to broaden opportunities and hedge downside risk. A better understanding of this process is of high practical as well as theoretical relevance. The findings are discussed by connecting various research streams from the fields of financial economics, strategic management and international management.

Key Words: Foreign Expansion; Uncertainty; Strategic Real Options; Subsidiaries
1 Introduction

1.1 Research Problem and Motivation

1.1.1 Choice between Flexibility and Commitment

Large corporations increasingly rely on foreign markets to grow their income. Some of the fastest growing spatial markets\(^1\) that promise such profits lie in the developing world, where the early stage of development often allows firms to shape the market. However, such emerging markets often also prove challenging for multinational companies (MNCs)\(^2\) as they quickly become fiercely competitive once recognised for their profit potential.

The velocity of change in such environments – in combination with a variety of other exogenous factors – leads to a high level of uncertainty\(^3\) that can be far above that of the industrialised world. This uncertainty is further amplified for foreign firms, whose managers are unfamiliar with the local market environment.\(^4\) Complexity, lack of information about customers and competitors, a constantly changing and inconsistent interpretation of the regulatory framework, as well as different cultural norms are characteristic challenges in these markets and result in another form of uncertainty that is endogenous to the firm.

The expansion of MNCs into such foreign markets is a highly complex process, involving a multitude of effects and counter-effects within the firm, and between the firm and its environment. A central quandary in foreign expansion is the trade-off between flexibility and commitment\(^5\) that shapes investment and organisational considerations.

One perspective on flexibility in organisations emphasises that it is valuable for firms to be able to adjust their operations to suit different future states.\(^6\) A very powerful theory that is frequently at the core of such arguments is the theory of real

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\(^1\) Spatial markets refer to countries, regions, or free-trade areas.

\(^2\) Unless indicated otherwise, the term ‘multinational company’ or MNC is used in a generic sense and does not reflect a particular type of strategy (e.g. as proposed by Bartlett and Ghoshal, 1998).

\(^3\) The term ‘uncertainty’, throughout this document, refers to uncertainty with respect to the future profitability of a company’s operations. Endogenous uncertainty can only be resolved by learning (used in this dissertation in the sense of application of knowledge and experience), while exogenous uncertainty is largely resolved over time (see, for example, Folta, 1998: pp.1010-1011).

\(^4\) See Hymer, 1960; Zaheer, 1995; Johanson and Vahlne (1977: p.24) use the term ‘psychic distance’ to describe these “differences in language, education, business practices, culture and industrial development.”

\(^5\) The term ‘commitment’ in this dissertation is mostly used as an analogy to the resource (capital) investment (or as a pledge to a cause).

\(^6\) See, for example, Volberda, 1998.
Foreign Expansion under Uncertainty

options. It comprehensively connects uncertainty with investment policy and allows (in certain cases) calculation of the monetary value of options. Real options theory provides a systematic sense of the value of managerial flexibility and inverts traditional thinking found in organisational literature about the absorption of uncertainty. A real options perspective allows decision-makers to proactively manage uncertainty, rather than attempting to avoid uncertainty where it is comparatively high.

A contrasting perspective suggests that flexibility rarely comes without significant cost. Keeping a large number of strategic options open is almost inevitably linked to higher complexity and coordination costs. Real options usually require an upfront investment and subsequently incur ongoing costs to maintain the flexibility. Too much flexibility and a lack of organisational and financial commitment can also have strongly adverse effects, particularly in environments where trust is a cornerstone of business activity. Such lack of initial commitment can raise the likelihood of failure. Stretching existing resources too thinly over too many options in order to maintain flexibility (for different future developments) can also lead to the situation where none of the scenarios can be realised. Some authors suggest that companies should instead take pre-emptive positions through quick and large investments to claim the market.

The implications for MNCs in their endeavours to enter and expand in new spatial markets are not immediately clear. A better understanding of the trade-off, Ghemawat (1991: p.xi and p.25) claims that “costly-to-reverse commitments to durable, specialized factors” are the only general explanation for sustained performance differences in organisations.

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7 See Dixit and Pindyck, 1994; Trigeorgis, 1996.
8 Due to the rigid requirements for data and framing of contingent decisions it is only applicable in few isolated cases. However, the underlying mathematical principles of this theory have inspired a conceptual view of real options in the strategic management literature.
9 See Bowman and Hurry, 1993; Kogut and Kulatilaka, 1994b.
10 See Kogut and Kulatilaka, 2001: p.745; Bowman and Moskowitz, 2001: p.777; organisational theory emphasises ‘uncertainty avoidance’ (March and Simon, 1958) that leads companies to absorb uncertainty, while real options theory implies exploiting uncertainty as a superior modus operandi.
11 See Kogut, 1989; Hurry, Miller and Bowman, 1992; McGrath, 1997.
12 See, for example, Cyert and March, 1963; Kahneman and Lovallo, 1993: p.18.
13 See, for example, Kemna, 1993: p.269, who examined options in a case study at Shell Oil.
16 See Barnett, 2003: p.188.
18 See, for example, Hout et al., 1982: p.106; Lieberman and Montgomery, 1988: p.48; Such behaviour seems to be consistent with Penrose’s (1959: p.209) observation that large companies “often prefer a single large, capital-using project to a number of smaller ones”, which might be largely driven by the sub-optimal operating characteristics of small-scale investments.
fundamental principles that influence the optimal balance between flexibility and commitment – within the organisation and over time – could help managers to improve decision-making under conditions of uncertainty.

The aim of this study is therefore to investigate, both conceptually and empirically, the following question of balance between flexibility and commitment: how should MNCs structure their expansion into foreign markets under high uncertainty?

1.1.2 Relevance of Foreign Expansion under Uncertainty

Research Gaps
To date, academic research on corporate expansion strategies for foreign markets has predominantly focused on ‘outbound’ expansion. The study of ‘inbound’ (or within-country) foreign expansion – which represents the logical extension of the Johanson and Vahlne (1977) chain-of-establishment framework – has so far been sparse. One important difference between outbound and inbound expansion is that the knowledge and capabilities gained through experiential learning are much more transferable in within-country expansion. As a result, the two processes are not fully comparable.

A common finding in international and foreign expansion research is that ‘commitment’ to foreign operations is incremental and a consequence of experiential learning. However, the key contingency on uncertainty in those studies remains either vague or is missing entirely.

This dissertation builds upon prior research on sequential investment and will take a strategic real options perspective to analyse the expansion process in highly uncertain environments. Bowman and Hurry’s (1993) conceptual work on the strategic real options in incremental-choice investment processes has strongly influenced the view taken in this study that investment size reflects option characteristics. Real options theory suggests a connection between uncertainty and investment that has so far rarely been explicitly considered in the international

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19 Most research on international expansion focuses on ‘outbound’ expansion, from the home location outwards; little research so far has examined ‘inbound’ expansion, within a single foreign country. The foreign direct investment (FDI) literature tends to take an ‘inbound’ perspective, but looks at the topic primarily from a macro-economic angle that is not considered relevant for the analysis in this dissertation.

20 Examples include notably research by Chang, 1995; Chang and Rosenzweig, 2001; and Song, 2002.


22 Uncertainty, flexibility, corporate entrepreneurship (along with co-operations through JVs and business networks, and organisational change) have also been identified by Buckley and Casson (1998: p.22) as topics for a new research agenda in international management.
management literature. The few studies that touch on real options in an international management setting have so far only addressed isolated situations and – for the most part – have been of a purely conceptual nature. Furthermore, the strategic options perspective in its use in the extant literature does not incorporate the endogenous uncertainty encountered in foreign markets and the organisational consequences related to an options-approach. In order to address these research gaps, the focus of the analysis in this study is on the circumstances (including the level of uncertainty) under which companies should invest, and at what scale.

Many ideas of financial economics and strategic management are naturally related to such a process. The process of organisational learning is responsible for both the creation of dynamic capabilities and a reduction of (endogenous) uncertainty. Equally, an options heuristic encourages flexibility, exploration of uncertainty and learning.

This study seeks to integrate insights from financial economics, strategic management and international management research in order to shed light on the expansion of MNCs in highly uncertain foreign markets. Academic theory could greatly benefit from a better understanding of the expansion process from a capital budgeting perspective.

Implications for Managerial Decision-Making

Corporate expansion in environments with a high degree of uncertainty is a difficult process even for experienced firms. The academic research on the topic so far has provided little guidance for MNCs on how to address the expansion. It is evident that companies need to respond to uncertainty not only in an intuitive or haphazard way, but with contingency planning that addresses potential alternative

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23 Exceptions include most notably Kogut’s (1991) analysis of international joint ventures as real options, Campa’s (1994) examination of capacity expansions under the influence of exchange rate uncertainty.

24 Examples for conceptual studies on real options in international management include Rivoli and Salorio’s (1996) work on delayability and reversibility aspects of strategic options in foreign direct investment; Casson and Gulamhussen’s (2000) considerations for real options in international business (from an economics perspective); as well as Chi and McGuire’s (1996) work on ownership options in international joint ventures.

25 Essentially, such a decision will, of course, be taken by senior managers. But as these managers represent their organisation, this text will refer to them as company decisions.

26 See Grant, 1996; Teece, Pisano and Shuen, 1997; Sanchez, 1997: p.77.

27 See, for example, McGrath, 1997.


29 There are, of course, many subjects that are related to ‘foreign expansion under uncertainty’ apart from the capital budgeting perspective taken in this dissertation. Many of these are of great importance to the organisation but cannot all be covered within this dissertation. They deserve attention in further research as for most of them no separate integrated theory exists for developing environment with a high degree of uncertainty. Such topics might include human resource management, strategic decision-making processes (e.g. Kukovetz, 2002), logistics, and marketing.
developments. They also need to structure their organisations in ways that reflect the requirements of an uncertain environment.

Providing foreign operations with a high degree of flexibility appears to be an intuitive response to high uncertainty. Such flexibility from a capital investment perspective is most pronounced in the levels of initial investment in foreign subsidiaries, where a small investment provides more strategic flexibility in relation to the capital employed. If such flexibility in an environment with high uncertainty were indeed superior to high commitment, this should result in higher value. There is anecdotal evidence that corroborates this conjecture; it appears that the most successful subsidiaries established by MNCs in China are those which had only a small initial investment and “ramped-up capacity in response to, rather than in anticipation of, increased demand”.\(^{30}\) Examining this issue systematically deserves high attention.

### 1.1.3 Context and Nature of the Empirical Investigation

There is so far little published research on real options in international management. As a result, the present study is exploratory in nature and novel in many aspects. In order to provide depth and a wide scope to the study, both qualitative and quantitative methods have been employed. Rather than resorting to existing databases, the data collected (from companies and other sources) was tailored in its specifications to test the conceptual framework developed in this dissertation. This inevitably means that some of the measures, while designed with utmost care, may not have been used before. In China, the chosen setting for the study, data is particularly difficult to obtain. Official data is scarce and has in the past often been of doubtful quality. This leads – as in many other research settings – to compromises with regard to the choice of certain measures.

The Chinese market has always been, and will long remain, a very difficult environment for MNCs. Since the opening up of the Chinese market in the late 1970s, the high level of uncertainty for MNCs operating in this environment – in combination with high expectations with regard to the economic prospects – has led to many management misjudgements (such as overly optimistic assessments of potential market size) and business failures. China is the largest emerging market and has attracted more foreign direct investment (FDI) in the past 25 years than all other emerging markets and non-industrialised countries.\(^{31}\) Due to its rise as one of

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30 Economist Intelligence Unit, 2001: p.3.
the world’s largest economies the country is of high strategic interest to most global corporations. Because of the enormous number of foreign invested subsidiaries, the country is an ideal place to study the research question of this dissertation. The variation of choices between flexibility and commitment allows the comparison and analysis of a broad range of expansion strategies. These aspects all underline the high relevance of studying the research question in the context of China.

1.2 Structure of the Thesis

At the heart of this thesis is a comprehensive assessment of subsidiaries as investment vehicles that are seen as strategic options to MNCs. Consequently, subsidiaries are also the principal unit of analysis. Chapter 2 presents a review of the literature on subsidiaries in strategic and international management, strategic real options, and conceptualisations of uncertainty. International management literature and real options theory form the core of the thesis, but the analysis also draws extensively from strategic management literature. The concept of uncertainty, which is central to the strategic real options, is discussed to round the theoretical basis of this dissertation. Chapter 3 utilises existing insights to develop a conceptual framework for the analysis of strategic real options and their role in foreign expansion under uncertainty. This conceptual framework leads directly to the research questions, hypotheses and propositions. Chapter 4 discusses the research design that was used to explore and test the conceptual framework. It also defines the variables used for statistical testing. The empirical findings are then split into two parts: (1) a more qualitative theory building part (Chapter 5) that presents the findings on expansion in a ‘contingency framework’, supported by a discussion of options in case studies in selected industries, and an analysis of boundary conditions of strategic options in international management; and (2) a theory-testing part (Chapter 6) that statistically examines capacity and ownership options as a basis for strategy in foreign within-country expansion based on the conceptual framework developed earlier. Chapter 7 then combines both empirical parts to form a synthesis of an options-based management approach and discusses practical implications for managers. Chapter 8 presents the conclusions, the contribution to academic theory, and highlights the limitations of the present study as well as areas for future research.

32 Italics are used to highlight references to chapters, sections, exhibits, research questions, hypotheses, propositions, but also mark longer quotes and Latin words.
1.3 Topic Definitions

This dissertation takes the perspective of market-seeking\textsuperscript{33} manufacturing MNCs\textsuperscript{34} entering and expanding their operations in foreign markets under a high degree of uncertainty.\textsuperscript{35} The main reason for the focus on MNCs is that there is typically no shortage of internal resources (primarily existing technology, capital, and skilled managers) within such firms and that they typically have the capabilities to build a new business organisation in a foreign country (this might be different for small- and medium-sized enterprises).\textsuperscript{36} Consequently, from a capital allocation perspective, the key considerations for the managers of those companies are when to invest, how much, and where. Subsidiaries, the main vehicles for expansion in foreign markets, are defined here as legal entities with a business licence that allows manufacturing in the foreign market of interest (in this case: in China controlled by a non-Chinese MNC).\textsuperscript{37}

For the purpose of this analysis, the environmental context referred to as China is defined as the People’s Republic of China but specifically excludes the two semi-autonomous special administrative regions of Hong Kong and Macao, as well as Taiwan (Republic of China). The market environment in China is – in terms of volatility, stage of development, and regulatory environment – seen as somewhat representative of emerging markets in general, although this comparison has, of course, to be qualified. The term emerging market is still widely used throughout this dissertation in reference to such an environment.

\textsuperscript{33} Market-seeking MNCs are defined as firms that actively compete and pursue market expansion in China, compared to those whose primary function is exporting from China (cf. Luo and Park, 2001: p.142).
\textsuperscript{34} The title of the dissertation refers to multinational companies as the main population for which the properties (and principles) of the foreign expansion process developed in this text are thought to be valid. The sample under review in the empirical investigation of this dissertation is more precisely defined as market-seeking, manufacturing MNC in low to medium capital-intensive industries. However, the idea of options are thought to be more widely applicable across the wider population of MNCs in areas where the criteria of uncertainty, irreversibility and managerial discretion are fulfilled.
\textsuperscript{35} MNCs, throughout this dissertation, are firms with global headquarters outside of China. Typically those companies have their global headquarters in North America, Europe or Japan. The reason why manufacturing firms are of particular interest will be explained later in detail in the context of the sampled population (Section 4.2.2). The term ‘market’ and ‘country’ is often used synonymously in this dissertation.
\textsuperscript{36} Equally, local firms mostly do not fit these criteria of available technology and ‘abundant’ financial resources when starting up in their own market.
\textsuperscript{37} Similar to Birkinshaw’s (1997: p.207) definition; this analysis is, however, focused on foreign subsidiaries in China.
2 Literature Review

The core literature streams that this dissertation builds on include (1) the literature discussing aspects of operating in foreign markets located in the international management as well as the strategic management research, (2) real options theory in the financial economics as well as its reflections in the strategic management literature, and (3) considerations about uncertainty in the economics, management and financial economics fields. These elements are discussed in the following sections.

2.1 Strategic and International Management

2.1.1 Mode of Entry in International Management

A significant part of the international management literature is concerned with three interlocking questions that firms face in the international expansion process: what market to enter (entry location), when to enter (timing of entry), and how to enter (entry mode). Of these dimensions the choice of entry mode seems to have attracted by far the most attention among researchers, possibly because it is considered one of the most critical decisions in the internationalisation process. The choice of entry mode has implications for the level of control, the amount of required investment, and the risk exposure of foreign operations. There is, however, not a single overarching theory for entry mode but rather it is the subject of a number of competing conceptual frameworks. These include most prominently the chain of establishment, the eclectic framework, the transaction cost approach, and the organisational capability perspective.

The chain-of-establishment framework is one of the earliest and most important schools of thought on the internationalisation of the firm. To a large extent the framework is based on the ‘Uppsala process model’ of international expansion by Johanson and Vahlne (1977). The authors had developed the framework in the mid 1970s based on insights from the behavioural theory of the firm.

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38 See Gaba et al., 2002: p.39.
40 See Luo, 2000: p.40; note that risk is here and throughout the document often used in reference to the chance of loss rather than as the quantifiable portion of uncertainty.
42 See Dunning, 1980.
43 See Anderson and Gatignon, 1986.
44 See Madhok, 1997.
model portrays the entry into foreign markets as a series of incremental decisions in response to the gradual acquisition, integration and use of knowledge about local markets. According to the model, a foreign presence follows four stages of development: (1) no regular export; (2) export via independent representative (agent); (3) establishment of a sales subsidiary; and (4) a manufacturing operation.

The chain of establishment framework has been criticised as portraying the entry into a foreign market in a deterministic manner that does not appear to be appropriate given the range of strategic choices (e.g. alliances) available to MNCs. One of the core elements of the framework, relating to the principles of the resource-based view, is that by performing activities (e.g. by establishing a sales subsidiary) a firm creates internal assets such as capabilities and (experiential) knowledge. Consequently, entry mode is influenced by the tacit knowledge gained through experience, which can create competitive advantage. Another important observation by Johanson and Vahlne (1977: p.30) is that the optimal scale of operations can be determined in the beginning in relatively stable and homogeneous markets but will otherwise depend on the level of uncertainty of the market environment.

The other frameworks offer partially overlapping but mostly complementary views on the internationalisation process. The eclectic framework is a multi-theoretical approach where the international trade theory, resource-based view and transaction cost theory serve as the main pillars. It suggests that the choice of entry mode is mainly determined by three factors: ownership advantages (firm-specific assets and skills), location advantages (attractiveness of market potential and investment risk), and internationalisation advantages (cost of choosing a hierarchical mode of operation over an external mode). The (modified) transaction cost approach predicts a positive relationship between asset specificity and inclination for high-control entry modes, dependent on moderating factors such as external uncertainty, internal uncertainty and firm size. Finally, the organisational

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48 See Andersen, 1997: p.32.
50 See Johanson and Vahlne, 1977: p.28.
51 See Kogut and Zander, 1993: p.626.
52 See Andersen, 1997: p.33.
53 See Dunning, 1980: p.11; Andersen, 1997: p.34.
capability perspective – with roots in the resource-based view – conceptualises firms as bundles of relatively static and transferable resources that are transformed into organisational capabilities. The organisational capability perspective focuses on the value of the firm capabilities and its implication for internalisation vs. collaboration. This perspective, which shares the emphasis on experiential knowledge with the chain-of-establishment framework, posits that exploration would tend to be a larger and more crucial part of a firm’s activities in uncertain environments.

Johanson and Vahlne (1977: p.30) most clearly recognise the relation between investment behaviour, experiential learning and the level of uncertainty in the environment. But while observing the symptoms they cannot offer a clear analysis or model that would describe the workings of this relationship between these three elements. The authors perceive the process as part of the seemingly inevitable sequence of incremental investments, but do not link these to financial performance considerations.

2.1.2 Strategic Role of the MNC Subsidiaries

Since the early 1980s, research in international and strategic management has focused increasingly on the roles and strategies of MNC manufacturing subsidiaries as their unit of analysis. The main driving force behind the growing interest in this area stems from the search for new sources of competitive advantage as firms globalise their operations. To gain these, scholars argue, it is necessary to create operational units (e.g. in the form of subsidiaries) that have the “ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.”

This quest for knowledge, resources and capabilities, as sources of competitive advantage in dynamically-competitive market environments requires companies to manage risks, achieve efficiency in their current operations, and innovate through learning and adaptation. Foreign operations, and the “gradual acquisition, integration and use of knowledge” in such environments, have often been

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57 See Andersen, 1997: p.36.
portrayed as a particularly important element of this proposition. The expansion into foreign markets is for most companies motivated by three main objectives: the search for resources, markets, and cheap labour. By nature, foreign firms have intrinsic disadvantages vis-à-vis local companies and incur cultural adjustment risk and cost generally referred to as the ‘liability of foreignness’. To compensate for these shortcomings, MNCs either need competitive advantages or they need to build capabilities through experience in managing in such environments.

Besides knowledge, resources and capabilities, the adaptation of the organisational configuration to the strategy, which in turn reflects the requirement of the environmental demands, has been highlighted as an important factor for superior performance. Birkinshaw (2000: p.53) has emphasised this point for subsidiaries, which – as he argues – are exposed to pressures from both the local environmental context and elements of the organisational context. The literature on the subsidiary role has traditionally defined subsidiaries in clusters of subsidiary roles that describe the purpose of a subsidiary within the MNC and were based on a cross-sectional clustering of strategic postures. The literature stream taking this perspective on subsidiaries often attributes different strategic roles to operating units depending on their mission. The evolution of the subsidiary role is thought to be related to depletion or enhancement of capabilities in the subsidiary in combination with an explicit change in the subsidiary’s charter (by the parent company).

In an effort to categorise MNCs and their subsidiaries, a number of conceptual frameworks have been developed that take different perspectives on internal and external forces that shape the structure and orientation of international operations. In one of the earliest classifications, Perlmutter (1969: p.14) introduces three

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72 Chandler (1962: p.13) defines strategy as “the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals.”
73 See Ghoshal and Nohria, 1993: p.31.
74 There is a second view that takes the view that subsidiary managers are utilising their strategic discretion to shape the charter of the subsidiary, rather than simply responding to orders from the parent company. See Birkinshaw (1997: p.210) for a summary on this research stream.
dimensions\textsuperscript{77} that characterise the relationship between headquarters and subsidiaries. These dimensions – applicable to product, function or geography – are described as: (1) ethnocentric – where the strategic decision-making happens mostly at the global headquarters, (2) polycentric – where the strategic decision-making is done in the different regions and countries, and (3) geocentric – where companies “[a]im for a collaborative approach between headquarters and subsidiaries.”\textsuperscript{78} Based on Perlmutter’s (1969) insights, the focus of global strategy has subsequently been narrowed to “how the firm structures the flow of tasks within its world-wide value-adding system.”\textsuperscript{79}

The framework developed by Prahalad and Doz (1987: p.18) provides a context-oriented classification of MNC subsidiaries.\textsuperscript{80} Their framework, which has subsequently been validated for subsidiaries by a number of researchers,\textsuperscript{81} describes the relationship between headquarters and subsidiaries, as well as between affiliated subsidiaries, based on three factors that characterise the nature of the business: the Global Integration of Activities, the Global Strategic Coordination, and the Local Responsiveness. The integration-responsiveness (IR) grid (see Exhibit 1) focuses on the two ‘essential’ demands, global integration and local responsiveness, assuming that the third, the degree of global strategic coordination, is to a large extent related to the need for integration.\textsuperscript{82} Subsidiaries can be classified into three basic types of strategic postures: global, local and multifocal businesses.\textsuperscript{83} Global businesses link activities across countries in an attempt to minimize overall costs. Local businesses “perceive pressures to respond strategically to local needs”\textsuperscript{84}. Multifocal businesses are exposed to pressures for both integration and responsiveness.

While the global businesses and locally responsive businesses – according to the authors – are relatively easy to structure, the management of multifocal businesses requires simultaneous consideration of global integration and local responsiveness needs.\textsuperscript{85} Based on the IR-framework, Jarillo and Martinez (1990: p.503) classified subsidiaries in three clusters: low integration and high

\textsuperscript{77} A further dimension ‘regiocentric’ was added in a later paper and was focused on marketing but is of little relevance for this study.
\textsuperscript{78} Perlmutter, 1969: p.12.
\textsuperscript{80} The integration-responsiveness framework, as Ghoshal, 1987: p.429 points out, was originally conceived by Prahalad (1975) in his unpublished doctoral dissertation and later discussed by a number of authors.
\textsuperscript{81} E.g. Jarillo and Martinez, 1990; Roth and Morrison, 1990; Johnson 1995; Taggart, 1998.
\textsuperscript{82} See Prahalad and Doz, 1987: p.16.
\textsuperscript{84} Luo, 2001a: p.453.
responsiveness: Autonomous Subsidiary; high integration and low responsiveness: Receptive Subsidiary; and high integration and high responsiveness: Active Subsidiary.86

Exhibit 1: The Integration-Responsiveness Grid

In an effort to analyse the connection between corporate strategy and the way subsidiaries are structured that is more focused on the value contribution, Birkinshaw and Morrison (1995) classify subsidiaries into three broad categories: Local Implementers, Specialised Contributors, and World Mandate subsidiaries.87 Typical local implementers have only limited geographic scope and adapt global products to the needs of the local market. Specialised Contributors have “considerable expertise in certain specific functions or activities”88, exhibit a high level of interdependence with affiliated subsidiaries but depend on a narrow set of value-creating activities (e.g. specialised manufacturing). World Mandate subsidiaries, in contrast, carry responsibility for a product line or entire business on a worldwide or regional basis.

In this view, subsidiaries are attributed a very important role for the strategic direction within MNCs as they influence the corporate development through subsidiary initiatives.89 Birkinshaw (2000) finds the development of subsidiaries to be a result of the expansion of “scope of activities and responsibilities within the MNC” (p.63). It can be seen as a function of three distinct forces: “the initiative of

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87 This classification is a further development and synthesis of existing classifications based on research including authors such as Bartlett and Ghoshal (1986) and Jarillo and Martinez (1990).
89 See Birkinshaw, 2000: p.63.
subsidiary managers, the investment decision of HQ managers, and the opportunities present in the local marketplace.\textsuperscript{90}

The environment-strategy-performance relationships of MNC operations are further explored in a study by Luo and Park (2001) where foreign subsidiaries are classified using the typology of the Miles and Snow’s (1978: p.29) strategic-orientation framework. The study focuses on subsidiaries with a market-seeking mandate (explicitly excluding resource-seeking mandates) and presents three types of subsidiary strategy orientations: the Prospector, the Defender, and the Analyser orientations.\textsuperscript{91}

The Prospector type is characterised as an innovator that employs an experimental approach with regard to emerging trends and technologies\textsuperscript{92} and emphasises scanning, identification, and capitalizing on emerging market opportunities.\textsuperscript{93} It is an adaptive mode that depends on decentralised decision-making. Luo and Park (2001: p.144) claim that this orientation bears high costs and risks for the subsidiary in maintaining flexible capabilities that can lead to managerial inefficiencies through the under-utilisation of assets. The Defender orientation seeks to refine and improve the cost-efficiency of technical and organisational processes and serves a narrow product or market segment. This set-up is, however, not suitable to respond effectively to rapidly changing environments and is a typical configuration for a resource-seeking rather than market-seeking subsidiary strategy. The Analyser orientation for subsidiaries is a combination of aspects of a Prospector and a Defender orientation. It “focuses on defending existing product markets through routinized, efficient, and formalized operations” while “cautiously penetrating new markets through intensified product/market innovations.”\textsuperscript{94}

All three frameworks to classify subsidiary roles suggest distinct strategic postures with regard to one central point: the balance between exploration and exploitation.\textsuperscript{95} In developing foreign market environments both factors are immensely important. Exploration is needed to quickly adapt to changing competitive landscapes\textsuperscript{96} while exploitation of comparative advantage and

\textsuperscript{90} Birkinshaw, 2000: p.63.
\textsuperscript{91} The Luo and Park (2001) classification of subsidiaries excludes the ‘Reactor’ orientation by Miles and Snow (1978) as the authors considered it a late stage orientation, inappropriate for market-seeking subsidiaries.
\textsuperscript{92} See Miles and Snow, 1978: pp.55-56.
\textsuperscript{93} See Luo and Park, 2001: pp.144-145.
\textsuperscript{94} Luo and Park, 2001: p.145.
\textsuperscript{95} See March, 1991; McGrath, 2001.
\textsuperscript{96} See McGrath, 2001: p.119; also emphasized by Andersen, 1997; and Madhok, 1997.
competitive opportunities are equally important to an MNC to position itself in the market. However, the understanding of the strategic role of subsidiaries (orientation) is merely one aspect of the wider strategic value of subsidiaries (contribution). Most authors see subsidiaries as a component of MNC optimisation, and performance implications of particular (entry) strategies for subsidiaries are then predominantly viewed from a corporate perspective. Both the Prahalad and Doz (1987) and the Birkinshaw and Morrison (1995) frameworks are conceived as classifying strategic roles of subsidiaries within the MNC.

These, however, do not explicitly address varying levels of environmental uncertainty. This feature is partly addressed by Luo and Park (2001), where the Prospector orientation, with its experimental character, is seen as a response to high environmental uncertainty. Yet, Luo and Park (2001) in their analysis of the most successful strategic orientation in China do not clearly recognise the temporary nature of the subsidiary role over time. Subsidiaries starting as a Prospector are likely to change their orientation (into an Analyser or a Defender) when they have reached a more mature stage of development. Furthermore, the real value of an experimental structure, such as the Prospector, lies in the future. This is particularly evident in environments characterised by a high degree of uncertainty.

Birkinshaw (1997: p.210) notes that the literature on subsidiaries is divided into three main perspectives: first, a parent company perspective that emphasises ‘relative capabilities’ of subsidiaries and their contribution to the organisation; second, a view that perceives the subsidiary role as defined by the parent company; and third, where the subsidiary role is ‘enacted’ through coordination and control mechanisms. The mechanisms that weave the subsidiary into the organisation are critical components of the subsidiary strategy. The trade-off between control and autonomy, centralised and decentralised business models, is an important choice in the headquarters-subsidiary relationship that determines the degree of flexibility of the local organisation. Divergent views emerging in the literature are also often characterised by the focus of research: “The fact that subsidiary ‘role’ research favors control and subsidiary ‘strategy’ research favors autonomy” is, as Birkinshaw (1997: p.210) notes, “essentially a function of opposing perspectives of parent and subsidiary managers.”

This dynamic aspect should have been considered by Luo and Park (2001) when rating financial performance of different strategic orientations. It is only natural that start-up companies in foreign markets – likely to be a prospector type subsidiary – would have lower performance in their first years. A sensible analysis therefore requires a time-lagged measurement of performance.
2.1.3 Organisational Structure of Foreign Operations

While there is plenty of research on many aspects of the governance of subsidiaries, it is questionable whether all findings still hold today, given that MNCs and the world in which they operate (e.g. through technological development) have changed so dramatically over the last 20 years. Some findings from the relevant literature will be discussed below. The focus here is on the influence of the organisational structure on the flexibility of the local subsidiary.

Strategy and Structure

Structure and subsidiary governance is a tightly interwoven subject. The origins of academic thinking on the structure of international operations can to a large degree be traced back to the seminal work of Chandler (1962) and the insight that structure follows strategy, which in turn has to adapt to a changing environment. The structure, or organisational design, defines the lines of authority and communication between different entities and the information and data exchanged. Stopford and Wells (1972) took the idea of strategy dimensions, most importantly geographical spread and product diversification, and brought them in relation to mother-daughter structures (international division structure; global product division structure). Other studies followed similar arguments, most notably Franco (1976) who investigated the organisational structure of European MNCs and Egelhoff (1984), who compared different control mechanisms in European and American firms.

Administrative Heritage and Control

Bartlett (1986: p.372) further contributed to this literature stream with his finding that the administrative heritage is linked to the national origin and – in combination with task demands – strongly influences the organisational structure. He concluded that flexible organisational forms and management systems in general were needed to cope with international expansion.

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98 ‘Governance’ is here defined as the exercise of authority through strategic direction and control mechanisms.

99 ‘Structure’ is defined as the design of the organisation to administer the activities and resources necessary for growth (Chandler, 1962: pp.13-14).

100 Chandler (1962: p.385) identifies four phases in the history of development of large American corporations: “the initial expansion and accumulation of resources; the rationalization of the use of resources; the expansion into new markets and lines to help assure the continuing full use of resources; and finally the development of a new structure to make possible continuing effective mobilization of resources to meet both changing short-term market demands and long-term market trends.”


102 Most prior research in the Anglo-Saxon literature was focused on American enterprises.

Bartlett and Ghoshal (1998: pp.55-60) categorises firms into four generic types of organisations: international (centralised decision-making), multinational (decentralised federation of country organisations), global (home country centred, foreign country are ‘delivery pipeline’) and transnational structures (a form of matrix-organisation). These structures can also be closely linked with the prevalent management culture and the characterisation of organisational types is consistent with earlier findings that showed that European companies tend to have a more decentralised governance model.¹⁰⁴

In decentralised organisations, the foreign country or regional manager has great autonomy on most strategic decisions within his sphere. In contrast, American firms and Japanese firms are found to follow a more centralised governance model.¹⁰⁵ Variation also exists within organisations and along functional boundaries, where some functions, such as finance, are often very centralised and others, such as human resource management, are commonly very decentralised functions.¹⁰⁶

The degree of centralisation also varies with the context and type of strategic decision. Some strategic decisions such as, for example, the pricing of products, are more likely to be centrally coordinated.¹⁰⁷ Other decisions that are more specific to a local market would often be more decentralised. Taggart (1998: p.663) observes that there is some (variable) degree of local autonomy “which allows a subsidiary to develop a partial or complete strategic response that meets local pressures, needs and requirements” – creating flexibility on the subsidiary level.

**Autonomy of Subsidiaries in Foreign Markets**

Autonomy is a key parameter that characterises the strategic management of subsidiaries. The degree of autonomy conceded by the headquarters influences the speed of decision-making as well as the identity of the subsidiary. The centralisation of authority over strategic decision-making away from the local level was also found to have psychological implications, as managers at the country level tend to feel deprived of applications for their skills and creativity and can become discouraged or even disenfranchised.¹⁰⁸

Headquarters “tends to centralize with regard to strategic questions and decentralize with regard to operational matters.”¹⁰⁹ But subsidiaries often have a role

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¹⁰⁴ See Stopford and Wells, 1972; and Franco, 1976.
¹⁰⁷ See Koput, 1985: p.35.
¹⁰⁹ Hedlund, 1981: p.34.
in strategic decisions that affect areas where they have a particular expertise. The point which distinguishes centralised from decentralised models for the governance of foreign operations is the degree to which the local subsidiary can influence or even decide on strategic decisions relating to its own future.\(^\text{110}\) Strategic decisions, according to Hedlund (1981), are considered those where the subsidiary (1) draws on – or directly affects – central resources,\(^\text{111}\) (2) incurs long-term obligations on part of the MNC,\(^\text{112}\) or (3) which affect the consistency of the common framework for organisational routines.\(^\text{113}\) The country headquarters and the subsidiaries often have considerable scope with regard to resource allocation – for example, through reinvestment of earnings within the same subsidiary or within the country group.\(^\text{114}\)

The degree of subsidiary autonomy requires constant adaptation in light of the balance between the need for global coordination and the need for local responsiveness.\(^\text{115}\) Host government influence on the foreign subsidiaries – which often requires a ‘local face’ and a high degree of local responsiveness – as well as other external pressures complicate the headquarters-subsidiary relationship.\(^\text{116}\) In addition, headquarters managers are in many cases too far removed to understand the local operating environment. Flexibility and the ‘shifting between orientations’, a change in the relationship between headquarters and subsidiaries,\(^\text{117}\) almost on a decision-by-decision basis is seen as a forceful measure to counter these pressures.\(^\text{118}\)

Early phase autonomy is seen as a typical and transitory phase for MNCs entering remote foreign markets, when the investment size is relatively small and where “the need for learning exceed the desire for control.”\(^\text{119}\) This observation is consistent with research that found subsidiary autonomy to be decreasing with increasing size of the parent company.\(^\text{120}\) Many large MNCs still regard some of their smaller foreign investment as not critical for the success of the overall company and

\(^{110}\) See Birkinshaw, 1997; related to corporate entrepreneurship in subsidiaries.

\(^{111}\) E.g. the use of expatriates, raising capital, dividend policy, expansion of production capacity, determination of royalties or transfer price agreements.

\(^{112}\) E.g. the introduction of new products, exporting, or importing.

\(^{113}\) E.g. the choice of public accountant, quality control norms, product designs, financial reporting standards.

\(^{114}\) See Kogut, 1983; Bower (1970) presents a wider discussion for the resource allocation process.

\(^{115}\) See Prahalad and Doz, 1987: p.158.


\(^{117}\) Shifting between integration and responsiveness orientation refers to re-defining and creating a “well-defined and well-understood role for subsidiaries and headquarters and a clear balance of power in resource allocation decisions” (Prahalad and Doz, 1987: p.167).


\(^{119}\) Stopford and Wells, 1972: p.20.

\(^{120}\) See Brooke and Remmers, 1970.
more of a portfolio gamble. They are therefore more inclined to cede control to these foreign subsidiaries and expect at least some of their ‘bets’ to succeed.

**Informal vs. Formal Modes of Control**

An important claim in what is referred to as the ‘contingency school’ literature is that organisations operating in highly uncertain environments adopt more informal modes of control and coordination as compared to organisations operating in environments with little uncertainty. Decisions in fast moving environments have to be made very quickly. The local expertise as well as the distance of and lacking expertise at the headquarters tend to favour decision-making at the local level – potentially with *ex post* sanctioning by the HQ. Such ambiguity makes the degree of subsidiary authority difficult to measure scientifically.

**Subsidiary Networks**

In the late 1990s, the predominant view of the headquarter-subsidiary relationship shifted away from a dyadic, hierarchical perspective of MNC headquarters and subsidiaries towards a perspective that emphasises a network of “diverse, differentiated inter- and intra-firm relationships”. But the vertical relationships are still fundamental with regard to aspects of subsidiary governance. For capital commitments and major business initiatives the subsidiary typically has to obtain approval from both the country headquarters and the business group management at the global headquarters. The flexibility, or capacity for immediate response, toward environmental changes is a defining characteristic for subsidiaries that is ultimately dependent on a number of factors. The need for coordination mechanisms, both with headquarters and other subsidiaries, as well as the velocity of environmental changes require a dynamic and tailored solution.

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122 See, for example, Burns and Stalker, 1961; and Lawrence and Lorsch, 1967.
123 This is also supported empirical evidence for Swedish firms by Hedlund, 1981: p.49.
125 O’Donnell, 2000: p.526
126 See Hedlund, 1981: p.33
127 See Schütte, 1996: pp.77-78.
2.1.4 Learning and Experience in Foreign Markets

Local Market Knowledge in Foreign Markets
Local market knowledge is commonly characterised as knowledge of language, culture, society, politics, and economy that is specific to a host country. Knowledge and uncertainty related to a particular market are conceptually inversely related, a high level of local market knowledge will typically result in less perceived uncertainty. This kind of knowledge can be tacit or explicit in nature but the distinction between the two types is in many cases difficult to make. Tacit knowledge is commonly portrayed as knowledge that is complex, difficult to codify (to structure knowledge into rules and relationships), and difficult to teach. Explicit knowledge by definition can be captured in writing and distributed within an organisation. Both types of knowledge have an effect on uncertainty in foreign markets.

Accumulation of Knowledge through Organisational Learning
Experience is one type of knowledge that is commonly acquired over time. Experience and other country-specific knowledge about task and institutional environment cannot be easily acquired in factor markets and is considered an owner-specific advantage in the international management literature. The accumulation of such knowledge requires in most cases a time-consuming effort that is typically a positive function of the length of presence in a host country, and is therefore difficult to shorten. A forced acceleration of the learning process can result in higher costs due to ‘time compression diseconomies’. But disadvantages compared to more knowledgeable firms are likely to be mitigated over time as firms learn from the mistakes of others and the environment gets more mature.

Learning occurs when people develop “knowledge about action-outcome relationships and the effect of the environment on these relationships.” Organisations are said to learn through exploration of opportunities and creation of

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129 See also Arrow, 1984, who finds that “Information is merely the negative measure of uncertainty. [...] When there is uncertainty, there is usually the possibility of reducing it by the acquisition of information.” (quoted by Ghemawat, 1991: p.109)
133 See Luo, 2000: p.50.
137 Duncan and Weiss, 1979: p.84; see also Argyris and Schön, 1978.
variance\textsuperscript{138} and using trial-and-error experimentation.\textsuperscript{139} According to Levinthal and March (1993: p.97), there are two principal mechanisms that facilitate learning from experience: simplification and specialisation. In the simplification process, experience is simplified and effects of the spatial and temporal neighbourhood are conceptually reduced. In contrast, learning processes that focus attention on narrow competence are classified as specialisation. These characteristics frequently lead to myopic behaviour in the process of learning, such as the tendency to ignore long-run effects (while focussing on short-term objectives), ignoring the larger picture, or overlooking failures.\textsuperscript{140} The more complex, dynamic and uncertain the environment\textsuperscript{141} the more likely managers are to be tempted to over-simplify the situation and draw false conclusions.

**Learning in Subsidiary Groups**

The organisational learning literature emphasises that experiential learning is a key element for the development of these rent-generating capabilities, which are created through complex interactions among resources over time.\textsuperscript{142} Companies accumulate these capabilities through routinisation of activities, learning-by-doing and organisational evolution that is constantly guided by the discrepancy between expectations and experience.\textsuperscript{143}

The degree of local market knowledge of MNCs in highly uncertain markets has a substantial effect on a broad array of strategic management decisions (such as the choice of entry mode) and ultimately performance.\textsuperscript{144} As decision makers tend to be cautious about risk,\textsuperscript{145} MNCs typically invest incrementally\textsuperscript{146} – guided by their accumulated knowledge and based on the creation of resources and capabilities that provide preferential access to new opportunities.\textsuperscript{147} Such a process is consistent with observations made earlier by Cyert and March (1962: pp.100-102), who suggest that companies strive to avoid uncertainty, and that organisational adaptation and learning from experience are key factors that shape decision-making. An important observation by Johanson and Vahlne (1977: p.30) is that market uncertainty can be

\textsuperscript{138} See March, 1991; Levinthal and March, 1993; McGrath, 2001.
\textsuperscript{139} E.g. Huber, 1991; Sitkin, 1992.
\textsuperscript{140} See Levinthal and March, 1993: p.110.
\textsuperscript{141} Such environments are also closely associated with D’Aveni’s (1994) ‘Hypercompetition’.
\textsuperscript{142} See Levitt and March, 1988; Butler, 1995.
\textsuperscript{143} See Luo, 2000: p.50; Levitt and March, 1988.
\textsuperscript{144} See Luo and Peng, 1999: p.287; Luo, 2000: p.68.
\textsuperscript{146} See Johanson and Vahlne, 1977: p.23.
\textsuperscript{147} See Bowman and Hurry, 1993: p.774; Chang, 1995: p.384.
expected to be reduced through experiential learning when “market conditions are fairly stable and heterogeneous” compared to an unstable market environment where “experience cannot be expected to lead to decreased uncertainty.” It is, however, likely that companies then start to actively reduce a high degree of uncertainty (e.g. through market research) if more passive, experiential learning fails to improve visibility. With their accumulated knowledge on foreign host markets, practices and environments, MNCs can reduce uncertainty and enhance subsidiary performance.\textsuperscript{148} Therefore, a superior knowledge base is a competitive advantage and can be viewed as a source of rent-generating intangible assets.\textsuperscript{149}

The ability to respond and adapt to environmental changes can also be influenced by the distance between cultural values and social behaviour of the home and host country.\textsuperscript{150} A central assumption of the chain-of-establishment framework is that the cost of the ‘liability of foreignness’\textsuperscript{151}, which arises in the process of developing foreign operations and shapes a portion of the uncertainty, can over time be overcome through experience.\textsuperscript{152} The concept of the ‘liability of newness’ by Freeman \textit{et al.} (1983) holds similar assumptions about the reduction of this disadvantage through increased external legitimacy, experience, and ties. A subsidiary with a superior level of experience is more likely to commit resources to local operations.

Local market experience needs time to settle in the organisation to be used and distributed.\textsuperscript{153} Vermeulen and Barkema (2002: p.639) found that there are certain limits to the speed of (outbound) international expansion that imply that the success-rate of hastily created subsidiaries suffers if the company is not able to digest such knowledge in time. This phenomenon is linked with the notion of the ‘absorptive capacity’ of an organisation.\textsuperscript{154} An organisation’s existing knowledge base will influence its performance to learn in future situations.\textsuperscript{155} As a result, there is a natural time lag between the acquisition of new knowledge and the ability of using it within the appropriating entity and the network of other firms.

\textsuperscript{149} See Caves, 1971; Hennart, 1982; Buckley, 1983.
\textsuperscript{150} See Hofstede, 2001: p.443.
\textsuperscript{152} See Chang, 1995: p.388.
\textsuperscript{153} See Eisenhardt and Martin, 2000.
\textsuperscript{154} See Cohen and Levinthal, 1990.
\textsuperscript{155} See Cohen and Levinthal, 1993: p.130.
As important as the integration, accumulation and analysis of knowledge, is its dissemination to the relevant individuals within a company. Empirical studies on firm internationalisation have highlighted the critical importance of this local market knowledge with their findings of a positive correlation between such owner-specific assets and venture success.\textsuperscript{156} Most of these studies have focused on the learning effect from the first entry into foreign markets. However, the dissemination of knowledge gathered in this process and its transfer to further entrants in the same market to date has been subject to little research.\textsuperscript{157}

A central problem for multidivisional companies as well as subsidiary groups is the separation and division of knowledge.\textsuperscript{158} The strategic business unit (SBU) structure favoured by large MNCs is recognised for hampering the dispersion of knowledge, as the compartmentalised business structure encourages the fulfilment of SBU performance objectives rather than contributing to the overall group value.\textsuperscript{159} These kind of organisational structures raise barriers to knowledge transfers between divisions and SBUs as each operating unit is treated largely as a separate firm.\textsuperscript{160} As a result, resources are wasted when each business unit tends to ‘reinvent the wheel’ (in the worst case repeating mistakes) by exploring the local market environment without consulting experienced affiliated subsidiaries that have entered the same market earlier.\textsuperscript{161} This could explain why some firms seem to learn from their experience, while others do not.\textsuperscript{162}

The tacit knowledge is often the most critical knowledge and also the most difficult to transfer within an organisation.\textsuperscript{163} However, research of subsidiary groups has shown that lateral relations, in terms of people, products and knowledge flows exist\textsuperscript{164} and can be used to generate, accumulate and disperse knowledge.\textsuperscript{165} This process takes time as experience can only be utilised when it has been gained in a previous period.\textsuperscript{166}

\textsuperscript{156} E.g. Kogut and Chang, 1991; Chang, 1995.
\textsuperscript{157} The benefit of intra-country learning effects for subsidiaries has been shown only for firms with sufficient earlier experience with foreign national cultures – i.e. firms entering foreign markets by acquisitions or joint ventures (see, for example, Barkema et al., 1996: p.163).
\textsuperscript{158} See Hedlund, 1994: p.82.
\textsuperscript{159} See Lasserre and Schütte, 1999: p.228.
\textsuperscript{161} See Lawrence and Lorsch, 1967: p.229.
\textsuperscript{162} See Barkema et al., 1997: p.438.
\textsuperscript{164} See Birkinshaw and Morrison, 1995: p.737.
\textsuperscript{165} See Tregasikis, 2003: p.442.
\textsuperscript{166} See Casson, 1995: p.93.
These intra-group learning capabilities are widely considered crucial to successful entry and competitive positioning in dynamic market environments.\textsuperscript{167} The knowledge in dynamic environments such as developing markets often has only short-term value as it obsolesces quickly.\textsuperscript{168} As a result, companies have to develop capabilities, similar to Argyris and Schön’s (1978) ‘deutero-learning’ (learning to learn), in order to counter a rapidly changing environment.

**Uncertainty, Learning and Competitive Advantage**

In environments with a high degree of uncertainty, subsidiaries entering a new market are required to learn quickly in order to compensate their knowledge deficit compared to local competitors.\textsuperscript{169} The entry into a foreign market will generally also escalate the level of competitiveness, as local players react to the intrusion into their home market.\textsuperscript{170} This phenomenon is typically further aggravated by a higher degree of foreignness, which requires MNCs to develop new capabilities and adapt existing intangible asset advantages.\textsuperscript{171}

In highly exploratory projects only little knowledge exists on the environment and uncertainty is high. Learning (through action) and time both reduce uncertainty about future outcomes.\textsuperscript{172} In a first phase of exploration, a subsidiary’s main objective is to gain knowledge about such unfamiliar landscapes.\textsuperscript{173} For such an environment, MNCs require a strategy that maximises its learning potential. A high level of external variety in the environment should – according to the principle of requisite variety\textsuperscript{174} – be countered by an elevated degree of internal variety.\textsuperscript{175} Such variety, following the selection and retention of the best solutions,\textsuperscript{176} ultimately leads to learning.\textsuperscript{177} Learning in turn strengthens the competitive advantage\textsuperscript{178} as it augments knowledge and resources,\textsuperscript{179} positioning the company better in the

\textsuperscript{167} Such effective learning echoes Teece et al.’s (1997: p.516) conceptualisation of the creation of dynamic capabilities.

\textsuperscript{168} See Buckley and Casson, 1998: p.36.


\textsuperscript{173} See McGrath, 2001: p.120.

\textsuperscript{174} See Ashby, 1961.

\textsuperscript{175} Refers to variance of internal modes.

\textsuperscript{176} This reflects an evolutionary cycle; see Aldrich, 1979: p.33.

\textsuperscript{177} See Nonaka, 1994: p.29; McGrath, 2001, p.118.

\textsuperscript{178} Firm-specific competitive advantage is, as Buckley and Casson (1998: p.29) note, essentially a short-run concept as they “continually obsolesce and have to be regularly renewed”.

\textsuperscript{179} See Grant, 1991: p.117; knowledge can also be considered a resource (which is embedded in employees) – see Johanson and Vahlne, 1977: p.28.
competitive environment.\footnote{March, 1991: p.83.} Such experience and organisational learning have a significant effect on the performance of foreign subsidiaries.\footnote{E.g. Johanson and Vahlne, 1977; Kogut and Singh, 1988; Hennart, 1991.} One effect of the slack financial resources (gained through the utilisation of superior knowledge) available to the firm is that they do positively affect the strategic manoeuvrability and the creation of new opportunities (dependent, of course, on the level of control over resources by management).\footnote{See Dierckx and Cool, 1989: p.1504; McGrath, 1999: p.21.} This, in theory, could lead to a virtuous cycle.

**Exploration and Exploitation in Foreign Markets**

Firms entering foreign markets, even more than in many other areas, have to find the right balance in the configuration of their assets between exploration (“search, variation, risk taking, experimentation, play, flexibility, discovery, innovation”) and exploitation (“refinement, choice, production, efficiency, selection, implementation, execution”).\footnote{March, 1991: p.71.} In dynamic environments, characterised by Madhok (1997: p.50) as an environment with rapid rates of technological change and short product life cycles, exploration would have a more critical role. In foreign markets, exploration might be more focused on finding opportunities than addressing comparative advantage – but the principles are likely to be the same. Exploitation of existing knowledge in highly dynamic environments is likely to leave the products and services offered as well as the organisation in a suboptimal state, unable to react to new challenges.

**Summary**

The way subsidiaries are governed is decisive for learning and flexibility of the foreign operations. The exploitation of existing resources and capabilities as well as the exploration of new opportunities are principal components of an entry into a foreign market with a manufacturing subsidiary. Learning and the acquisition of knowledge about the local market lead both to a reduction of endogenous uncertainty as well as to the development of market-specific capabilities.\footnote{Market-specific capabilities could also lead to the resolution of uncertainty.} As a result, this subsidiary role and the balance of exploration to exploitation change as the foreign presence evolves and more integration is required.
2.2 Strategic Real Options

Conceptually, the idea of real options can be traced to Miller and Modigliani (1961: p.416) who observed that the value of a company comprises two components: The first is the present value of future cash flows that will be generated by existing assets. The second component is the present value of ‘opportunities’ that represent “options to purchase additional units of productive capacity in future periods.”

The literature on real options can be broadly divided into the mathematical view, which is concerned with the determination of the exact economic benefit (classic real options theory), and the conceptual view, which emphasises the strategic value of managerial flexibility (also referred to as strategic-options perspective).

The mathematical view is widely discussed in the real options literature but has yet had little success in modelling the immense complexity of competitive rivalry, a cornerstone in management research. While the mathematical view has so far dominated the development of the real options field based on findings from the financial option pricing theory, the conceptual view has evolved relatively recently and in a more eclectic pattern. To fully understand the conceptual view it is crucial to be familiar with the assumptions as well as the complications of the mathematical view.

2.2.1 Real Options Theory

Background and Criticisms

Real options theory grew out of a method to value financial option contracts introduced by Black and Scholes (1973) and Merton (1973). It was then Myers (1977) who realised that organisational resource investments, though not based on formal option contracts, have analogous features to financial options and might be valued similarly. Later, the development of a valuation method using the standard binomial lattice tree by Cox, Ross and Rubinstein (1979) allowed a particularly intuitive analysis of option contracts that was easily transferable to capital budgeting decisions (see Exhibit 2 for an example of a valuation of a manufacturing plant). A further advancement important to the real options theory was the research performed by Geske (1979) on compound options (options on options) that allows

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187 E.g. Trigeorgis, 1996.
188 A very basic model incorporating game theoretic elements has been developed by Smit and Ankum, 1993.
the calculation for more complicated option structures often found in business situations.

Exhibit 2: Binomial Lattice Tree – Production Plant Valuation Example

<table>
<thead>
<tr>
<th>Year</th>
<th>Action</th>
<th>Value</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Invest</td>
<td>$800m</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Keep</td>
<td>$1,440</td>
<td>1,440 - 800 = 640</td>
</tr>
<tr>
<td>2</td>
<td>Keep</td>
<td>$1,200</td>
<td>1,200 - 640 = 560</td>
</tr>
<tr>
<td>3</td>
<td>Don't Invest</td>
<td>$833</td>
<td>833 - 560 = 273</td>
</tr>
</tbody>
</table>

Notes: In USD million; upper figures represent potential plant values contingent on uncertainty; lower calculations based on values of portfolio replication technique (bold figures); boxes represent suggested action; assumes an initial plant value of USD 1 billion; risk free rate of 8%; yearly volatility of 20%; binominal lattice trees are solved recursively and use a replicating portfolio technique to derive the option values (marked bold below the boxes); the replication assumes an alternative investment into an asset that yields the risk free interest rate; the expected volatility leads to the percentage change for up-movements ($u=1.2$) as well as symmetrical down-movements ($d=1/u=0.833$); going backwards in the event (or decision) tree allows the calculation of the value of the call option (here valued at USD 71 million).

Source: Adapted from Copeland and Tufano, 2004: pp.94-95 (see for details)

The term ‘real options’ was coined later by Myers (1984), proposing to use option-pricing theory on capital budgeting decisions as means of bridging the gap between financial economics and strategic planning. Kester (1984), building on Myers’ thinking, highlighted corporate growth opportunities and competitive aspects of options. This soon led to the insight by Mason and Merton (1985) that the tools used to quantify the value of financial options could also be applied for the valuation of real options. Before the development of real options theory, corporate strategists and managers were struggling with vague elements of managerial operating flexibility and strategic interactions. Decision science, a much older research stream, had developed stochastic decision trees to model the flexibility of staged decision making. The main difficulty with decision tree analysis is that it is dependent upon a

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quantified risk attitude based on the decision maker’s utility function – a weakness that has been rectified through the risk-neutral logic of option pricing.\footnote{See Kasanen and Trigeorgis, 1995: p.50.} In their work, Trigeorgis and Mason (1987) find that the valuation of options can be seen as an improved, economically corrected version of decision-tree analysis.\footnote{If the same parameters are used both methodologies yield the same result.}

Real options theory soon expanded with numerous incremental findings on quantitative valuation methods and applications that served as building blocks for the seminal and comprehensive work on real options theory by Dixit and Pindyck (1994) and Trigeorgis (1996). The theory has been expanded to a number of topics\footnote{For a review of real option topics see Lander and Pinches (1998).} that are to a varying degree related to strategic decision-making. Such topics include options in alliances,\footnote{E.g. Kogut, 1983, 1991; Chi and Anju, 2002.} in research and development processes,\footnote{E.g. Newton and Pearson, 1994.} staging options in start-up ventures\footnote{E.g. Sahlman, 1988.} and natural resource investments.\footnote{E.g. Brennan and Schwartz, 1985.}

Real options provide a framework that has the potential to improve decision-making by: (1) providing a structure to systematically organise the analysis; (2) comparing alternative investment opportunities; and (3) identifying options embedded in an investment opportunity.\footnote{See Kemna, 1993: p.270; Lander and Pinches, 1998: p.541.} The calculation of real option values then offers an optimal solution in the context of a particular abstraction of a decision-making process.\footnote{See Kogut and Kulatilaka, 2004: p.102.}

While there are clearly many benefits of using real options theory for strategic decision-making, there are also a number of reasons why the real options approach is so limited in its applicability in strategic analyses.\footnote{See Bowman and Moskowitz, 2001: pp.776-777.} A major disadvantage is that the underlying theory is very complex and the application of real option models requires in-depth knowledge which can be difficult to acquire. Consequently, it is often difficult to expose errors in the analysis and the results are easy to manipulate in order to meet certain objectives. Furthermore, the input variables are in most cases difficult to determine and often based on very vague estimates, leaving the analysis of the real option open to wide margins of error. Finally, the valuation of real options is in many instances far detached from the underlying assumptions originally postulated for the financial options pricing theory, making the usage of the same valuation techniques questionable.
Pricing of Financial Options

Real options theory is based on the theory used to price financial options. A financial option is the contractual right, but not the obligation, to buy (in the case of a call option) or sell (in the case of a put option) the underlying asset \( S \) for a certain price (exercise price \( - X \)) by a certain date (expiration date \( - T \)).\(^{201}\) The value of an option stems from the uncertainty (volatility \( - \sigma \)) about outcomes to which it relates.\(^{202}\) The pricing of options is based on the existence of perfect markets (no arbitrage) that allow the replication of the instrument through other securities.\(^{203}\) Furthermore, a key property of option valuation is that it does not involve any variables that are affected by the risk preferences of the investor\(^{204}\) and instead uses the risk-free interest rate \( r \) (which is risk-neutral, independent of risk preferences). The value of a European call option (assuming no taxes, no transaction cost and no dividends) at the time \( t \) is according the Black-Scholes (1973: p.644) formula:\(^{205}\)

\[
c = S \cdot N(d_1) - X \cdot e^{-r(T-t)}N(d_2)
\]

where

\[
d_1 = \frac{\ln(S/X) + (r + \sigma^2/2)(T-t)}{\sigma \sqrt{T-t}} \quad \text{and} \quad d_2 = d_1 - \sigma \sqrt{T-t}
\]

and \( N(.) \) is the cumulative probability distribution function for a variable that is normally distributed with a mean of zero and a standard deviation of one.\(^{206}\)

A Real World Application for Option Pricing Theory

Real options have been conceived as a way to use the knowledge of finance theory conceptually as a management tool as well as to quantify the implications for firm value. One motivation was to overcome the shortcomings of the net present value (“NPV”) analysis that inadequately captures two important aspects of extra value to a company.\(^{207}\) The first is operating flexibility that enables management to make or revise decisions at a future time (e.g. options to defer, grow, or abandon the project) within a single project. The other is the strategic option value of a project with regard to future and follow-up investments.

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\(^{201}\) See Black and Scholes 1973: p.637.
\(^{202}\) See Amram and Kulatilaka, 1999: p.5.
\(^{203}\) See Merton, 1973: p.143.
\(^{204}\) See Hull, 1997: p.239.
\(^{205}\) There are two main types of financial options: European options, which can only be exercised at maturity, and American options, which can be exercised at any time during the option period.
\(^{207}\) See Schwartz and Trigeorgis, 2001: p.47.
It is important to clearly distinguish regular managerial decisions from real options. To be classified as a real option, the contingent decision has to be (1) irreversible, where invested assets can only be recovered at substantial cost (e.g. with a salvage value close to zero);\textsuperscript{208} (2) there has to be uncertainty about the underlying returns;\textsuperscript{209} and (3) management has to have the discretion to decide on the exercising of the option.\textsuperscript{210} This decision will typically be based on information that will only become available at some time in the future. These conditions are necessary – but not sufficient – as the classification as a strategic real option, which also requires substantial strategic implications of the contingent decision.

**The Real Option Inputs**

The elements of the option pricing formula are important factors in any strategic analysis of real options. Merton (1973) has extended the Black-Scholes formula to include dividends, resulting in six inputs for the option pricing formula. These are translated analogously to the factors commonly used for real options valuation:

- **The value of the payoff (S):** present value of the future cash flows related to the exercise of the option (excluding the exercise price X);\textsuperscript{211}
- **The cost to exercise the option (X):** e.g. a one time capital investment at time \( T \);
- **Expiry date of the option (T):** e.g. used to determine the contractual time period \((T-t)\) from a certain point in time \( t \) during which the call option can be exercised to acquire a partner’s asset in a joint venture for a fixed amount \( X \);
- **The magnitude of uncertainty (\( \sigma \)):** measured by the (expected) volatility of the value of the underlying asset or returns (e.g. for natural oil exploration this could be the traded oil price);\textsuperscript{212}
- **Dividend payments (D):** foregone dividends while the option is not exercised;
- **The opportunity cost of capital (r):** for real options it is necessary to use two discount rates: while the calculation of the value of the option contract is made on a risk-neutral basis, the value of the payoff has to be calculated by using a weighted-average cost of capital in the discounted cash flow analysis.\textsuperscript{213}

\textsuperscript{208} See Copeland and Antikarov, 2001: p.84; Kogut and Kulatilaka, 2001: p.746.

\textsuperscript{209} See Dixit and Pindyck, 1994: p.3.

\textsuperscript{210} See Kogut and Kulatilaka, 1994a: p.124.

\textsuperscript{211} Amram (2002: p.53) suggests that alternatively a market-value-to-sales multiple can be applied for an expansion option.

\textsuperscript{212} Real options theory uses uncertainty in two ways. First, in an implicit way where different scenarios (the result of different environmental states) are derived, e.g. in a binominal lattice tree. The second approach uses uncertainty in an explicit way by assuming a distribution of returns (shaped by the different sources of uncertainty). Here, a stochastic process that is thought to simulate the development of the price (or value) over time is assumed to be influenced by two main parameters (besides others): the volatility and the mean.

\textsuperscript{213} See Amram, 2002: p.54.
Taxonomy of Real Options
Real Options can be categorised into three broad categories (Exhibit 3 summarises the characteristics of different real option types): options to invest/grow, deferment/learning options and options to divest/shrink operations (or part thereof). Options to switch can be seen as a combination of abandonment (put) and growth (call) options. A company typically contains a portfolio of interconnected and compound options (options on options).

<table>
<thead>
<tr>
<th>Exhibit 3: A Taxonomy of Real Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Invest/grow</strong></td>
</tr>
<tr>
<td>Scale up</td>
</tr>
<tr>
<td>Switch up</td>
</tr>
<tr>
<td>Scope up</td>
</tr>
<tr>
<td><strong>Delay/learn</strong></td>
</tr>
<tr>
<td>Study start</td>
</tr>
<tr>
<td><strong>Abandon/shrink</strong></td>
</tr>
<tr>
<td>Scale down</td>
</tr>
<tr>
<td>Switch down</td>
</tr>
<tr>
<td>Scope down</td>
</tr>
</tbody>
</table>

Source: Adapted from Copeland and Keenan, 1998: p.48

Complications in the Application of Real Options
There are a number of generally problematic factors that influence the reliability of results when traditional option pricing techniques are applied to real options: the difficulty to determine input parameters, interaction among options, and the abstract nature of the model assumptions.

The pricing of real options is limited by the availability and quality of its input parameters. This is particularly the case for the time horizon (life of the option) and the measurement of uncertainty. Then there are option interdependencies through the shared options and the issue of non-additivity for multiple options. Finally, some critical option pricing assumptions have to be considered which are implicitly contained in the theoretical valuation frameworks for real options.

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214 See Trigeorgis, 1996.
1) Valuation Parameters

Time Horizon
As the time horizon for real options is in many cases to some degree arbitrary, there is a considerable potential for misrepresentation of the option value. The option value is highly sensitive to the time horizon. A change of the life of the option with a value-to-cost ratio \(\frac{S}{X}\)\textsuperscript{215} of 1.0 from one year to two years results, for a simple call option, in an increased option value of c. 10% of the expected payoff (relative increase of the option value of 44%).\textsuperscript{216} This direct (non-linear) positive relationship between time and value is critical where no clear end to the option period exists.

Uncertainty – Homoskedasticity Assumption
A further difficulty is that most valuation methodologies assume homoskedasticity (\textit{i.e.} constant volatility) over the option period. This assumption is clearly not correct for real options as in most environments where issues, such as the product life cycle, can have a strong moderating impact.\textsuperscript{217} A further factor is that the actions of competitors might dramatically narrow or widen the probability distribution of returns.

Uncertainty – Measurement
The volatility (standard deviation) of the underlying cash flows, which is the basis for the valuation of the real options, is often extremely difficult to determine. In some few cases (such as natural resource investments) a reasonable estimate can be derived using a proxy measure, such as the volatility of historical commodity or stock prices. However, for companies with products that are not publicly traded or for those with an insufficient record of factor price movements, volatility of the underlying asset can only be estimated with relatively wide confidence intervals. The option value is even more sensitive to volatility than it is for the expiration time.\textsuperscript{218} Hence, data quality problems are amplified in the valuation the cruder the approximation.\textsuperscript{219}

\textsuperscript{215} The value-to-cost ratio is a term equivalent to the effectiveness of the investment. If value-to-cost ratio is below one (which is equivalent to an “out-of-the-money” financial option) the option would not be exercised (\textit{i.e.} in the case of a growth option, no investment would be undertaken). But if the option has still a time value, the decision would be delayed as value-to-cost ratio could rise above 1.

\textsuperscript{216} Based on the Black-Scholes option pricing formula for a European call option with a fixed volatility of 50%; no dividends; risk-free rate at 5%; \(S/X\) refers to the payoff to cost-of-exercise ratio.

\textsuperscript{217} See Bollen, 1999: p.683, who found that this could lead to a great error when assessing option value.

\textsuperscript{218} A change of +83% for the same base parameters as before when the volatility changes from 50% to 100%. Based on the Black-Scholes option pricing formula for a European call option with a one year option period; no dividends; risk-free rate at 5% and \(S/X = 1\).

\textsuperscript{219} The measurement of uncertainty will be discussed further in the sections (empirical studies on strategic real options and uncertainty) below.
Exercise Price
The techniques to value options assume that the exercise price is constant. But for real options this assumption rarely holds and the exercise price is often not fixed in advance but changes over time. In the trivial case, the exercise price changes in line with the value of the underlying and the option value is zero.220 There are many factors that can influence the exercise price such as the actions of competitors or economic factors (e.g. rising costs for building materials).

2) Shared Options and Competition
The effect of competition alters the characteristics of the real options value. In contrast to financial options, real options can be shared among competitors. Exhibit 4 outlines the optimal timing of the exercise of a company’s growth options under different competitive situations – for shared as well as proprietary real options.

Exhibit 4: Shared and Proprietary Options under Competitive Rivalry

<table>
<thead>
<tr>
<th>Threat of pre-emption but market power of dominant companies increases their ability to appropriate the value of exercised options for themselves</th>
<th>Dominant companies able to fully appropriate option value for themselves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tendency to retain options until weaker competitors exercise</td>
<td>No risk of pre-emption; options should be held until expiration</td>
</tr>
</tbody>
</table>

Shared options

- Little or no ability to appropriate the full value of an investment opportunity
- Rapid exercise of options for defensive or pre-emptive reasons

Proprietary options

- No risk of complete pre-emption, but threat of value erosion due to competitive activity
- Tendency to exercise options early to preclude erosion of value

Intense competitive rivalry

Source: Kester, 1984: p.159

Kester (1984: p.158) concludes that: “[i]n general, a company will find it pays to exercise its growth options earlier than necessary when: competitors have access to the same option; the project’s NPV is high; the level of risk and interest rates are low; and industry rivalry is intense”. The entry of imitators will lead to a reduction of both the mean and variance of potential cash flows.221 Pre-emption on shared real options by rival companies – as Miller and Folta (2002: p.658) highlight for entry

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220 In this case, there is no uncertainty and no benefit of waiting.

221 See McGrath, 1997: p.986.
options – can increase the subsequent cost (exercise price) or preclude further investment, cancelling out other real options. Smit and Ankum (1993) have approached the competitive situation from a game theoretic perspective222 but the analysis is designed for oligopolistic markets and relies on reasonably accurate information of competitors’ investment payoffs – a condition that is rarely satisfied in practice. The issue of shared options remains a fascinating but as of yet unsolved conceptual and mathematical quandary.

3) Interrelation and Non-Additivity
The real options that exist in a project or subsidiary company are often interrelated. Schwartz and Trigeorgis (2001: p.8) note that company valuation is often more complex as it involves multiple real options whose values may interact. This trait results in a non-additive quality compared to real options viewed in an isolated manner.223 Thus, decomposing the different interacting options within a company often does not lead to a straightforward solution.224

4) Other Critical Assumptions
The gap between a complex environment influencing real options and the pointed assumptions used to determine a price for financial options leads to a potential misrepresentation of the value. The factors cited above are partly responsible for the difficulty in calculating a definite value of an option (let alone multiple).225 Yet, there are other, more profound differences that could disrupt the analytic relationship. One source for a potential disconnect is the assumption of complete and efficient markets (no arbitrage) as it is the basis for the replication logic used to prove the option pricing formula (direct replication for real options is rarely is possible as there is in only a few cases a market for the underlying asset).226 Another potential source for a mismatch is the assumption of lognormal distribution of returns for the stochastic (Wiener) process (not necessarily the case when evaluating cash flows developments) when using the Black-Scholes formula or other continuous-time

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222 See also Kulatilaka and Perotti, 1998 and Grenadier, 2001 for further theoretical attempts to use game theory in the real options context.
224 Monte Carlo simulation can be used to approximate such solution if the parameters of the individual real options can be determined with a reasonable accuracy.
225 As a result, the option value can in most cases only be stated as a value range. Expecting precision from real option analysis, as Anderson (2000: p.248) notes, would be “missing the point of the analytical mission. Instead, the analysis enables the decision maker to evaluate the stakes and opportunities associated with the investment decision”.
226 See also Lander and Pinches, 1998: p.547.
models, which is – for this and other reasons – often ill-suited for the valuation of real options.

Such oversimplification in complex situations can easily become problematic when real options are applied without consideration of the underlying assumptions.\textsuperscript{227} The pricing mechanisms will produce a result even in completely inappropriate applications, leading to wrong conclusions and decisions. A well-informed approach is crucial as this elegant logic otherwise becomes counterproductive.

\subsection*{2.2.2 Strategic-Options Perspective}

Conceptual Developments and Criticisms

The conceptual view of real options, also referred to as the strategic-options perspective, is more concerned with implications on the management issues and the use of the options as a heuristic for strategy rather than determining estimates for their value.

In some of the first articles discussing the strategic aspects of real options, both Kester (1984) and Myers (1984) emphasise the value of growth options in strategic-decision making. In early treatments on the subject, the options construct was the set of undefined growth opportunities owned by a firm that originate from a bundle of resources and capabilities.\textsuperscript{228} Later, Mitchell and Hamilton (1988) assessed the management of research and development and the implications for a company’s competitive position from a strategic real options perspective. Other aspects of real options have been discussed by Kogut (1991), who views joint ventures as strategic real options to expand operations, and Hurry, Miller and Bowman (1992), who study technology and venture capital investments also using a strategic option perspective. While these contributions have enhanced the spectrum in which strategic real options are seen, there are a few authors who have taken the concept further with the intention to develop a comprehensive conceptual framework based on this perspective. However, these constitute important angles from which strategic real options can be seen.

Sanchez (1993: p.254) suggests that strategic flexibility is an important conceptual base for developing firm strategy in dynamic markets. This flexibility is mainly seen in the input and output markets where options arise. Sanchez classifies

\textsuperscript{227} See Kogut and Kulatilaka, 2001: p.746.

\textsuperscript{228} See McGrath, Ferrier, and Mendelow, 2004: p.87.
strategic options in three principal categories: product options, as the opportunity to introduce new products; timing options, the ability to choose the time to exercise product options; and implementation options, where a firm can “decide how to configure its value chain by choosing among alternative resources and capabilities.” The objective of strategy – from the strategic flexibility perspective – is “the acquisition of the set of resources and capabilities which endow the firm with its optimal set of strategic options.”

Bowman and Hurry (1993) view an organisation’s resources and capabilities “as a bundle of options for future strategic choice”, arising from its knowledge and capacity in the context of its environmental opportunities. They see options as path dependent and a result of the organisation’s existing investments, developed through the ‘sequential striking’ of options. Compared to Sanchez (1993), Bowman and Hurry (1993) characterise options in a more passive way: options are present but have to be first recognised as ‘shadow options’ before they can be managed.

Options are classified either as incremental options, which are simple call and put options, or flexibility options, which allow switching to an alternative use of assets. Bowman and Hurry propose that companies using optimal option strategies hold options during uncertainty and exercise them when conditions are stable.

Kogut and Kulatilaka (1994b) propose that platform investments can be seen as options for companies to create new business. They argue that companies have to overcome the common myopic behaviour towards business expansion and investment and suggest that the options perspective provides a valuable tool for strategic decision-making and the acquisition of new organisational capabilities.

The conceptual view was then further advanced by the publication of the comprehensive work by Dixit and Pindyck (1994) and Trigeorgis (1996) on the mathematical valuation of real options, which also brought the strategic options perspective to a new level, as it integrated and organised the real options findings, and spurred a broad interest in the topic. In response to this impulse, a number of further applications of strategic real options have been examined, for example, to analyse technology investment decisions, international expansion strategies, and international expansion strategies.

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229 Sanchez, 1993: p.255.
231 Bowman and Hurry, 1993: p.762.
232 See Bowman and Hurry, 1993: p.763.
233 See also Hurry, 1994: p.232.
234 See also Kogut, 1983.
235 See McGrath, 1997.
236 See Chang, 1995; Miller and Folta, 2002.
entrepreneurship, perspectives on capabilities and growth, and to illuminate aspects of strategic thinking and strategy development.

The strategic options perspective has also been brought into firm relation to other elements of the strategic management literature such as resource, capabilities, and organisation theory. Here, the concept of flexibility of resources proposed in the strategic options perspective was found to be consistent with the type of competitive advantage posited by the resource-based view of the firm. Schwartz and Trigeorgis (2001) note that:

> [s]ustainable competitive advantages resulting from patents, proprietary technologies, ownership of valuable natural resources, managerial capital, reputation or brand name, scale and market power, empower companies with valuable options to grow through future profitable investments and to more effectively respond to unexpected adversity or opportunities in a changing technological, competitive, or general business environment.

Contemplating the relationship of strategic options and capabilities, Kogut and Kulatilaka (2001: p.748) point out that the strategic-option perspective counters some ideas of the organisational theory, which emphasises ‘uncertainty avoidance’, ‘buffering uncertainty’, and creating organisational mechanisms to reduce uncertainty.

In the late 1990s and early 2000s, the strategic options perspective has become a more widely used component in the strategic management literature. A concern that accompanies this development is that many authors tend to over-stretch the theoretical foundations and ignore – or misinterpret – the underlying theory. In their critique of the use of real options as a strategy heuristic, Adner and Levinthal (2004: p.83) note that the concept of real options has been overextended to many situations where a proper framing of the option is impossible (e.g. slack search processes). Instead, they argue, the strategic options perspective should be applied to well-structured opportunities that are much better suited for application, such as overseas production facilities and innovation licenses. In response to this critique and in an

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237 See McGrath, 1999.
239 See Luehrman, 1998 for a graphic illustration (‘the tomato garden’), which provide a simple illustration of option-based management ideas.
242 See March and Simon, 1958; Cyert and March, 1963, p.120; Thomson, 1967; Pfeffer and Salancik, 1978.
effort to offer a more precise definition of real options in the strategic management
domain, McGrath et al. (2004: p. 86) summarise the definition within the extant
literature and define four ways in which real options can be seen: (1) as option value
that is a component of the total firm value, (2) as specific investment with option-like
properties, (3) as choices that might pertain to one or more proposals, and (4) as
heuristic for strategic investment.

Empirical Investigation of Strategic Real Options
So far, most of the work on strategic real options has been conceptual in nature and
only few authors have studied strategic real options empirically. The complexity of
the mechanisms as well as the difficulty of quantifying inputs are the likely reasons
why many of these studies use very crude approximations for the uncertainty
measure, a key variable in real option analysis. Most of these empirical studies use
aggregated macroeconomic factors (e.g. looking at factor price indices, exchange rates
and total investment at a country level) as proxies for uncertainty.

Furthermore, virtually all studies on real options were aimed at investigating
‘threshold effects’ (i.e. how absolute investment levels change when uncertainty
changes) and the option to defer (option to learn). Another commonality is that all
of these studies (including those in the management field noted below) view
investment levels in absolute terms, not considering the subtleties of a small
investment (an options structure) compared to no investment at all.

The comparison of empirical studies in Exhibit 5 highlights several critical
points in such investigations. First, the measured real options construct itself is
often very vague. Options are extremely difficult to identify and to capture in
numbers in a management and corporate context. Most of the empirical studies
carried out so far only focus on peripheral aspects of options but do not address the
core proposition that options have value under uncertainty (although some are, of
course, implicitly related). The focus of inquiry of all the studies listed in the table
below is centred on the effect of adding, executing or abandoning options (frequently

244 However, a number of studies on non-strategic real options exist.
245 See Carruth et al., 2000: pp.130-131 for a summary of such studies.
247 To the best of the author’s knowledge, these are all empirical studies on strategic real options in the strategic
or international management field at the time of writing. There are a number of experiments (e.g. Miller and
Shapira, 2004) or simulations (e.g. Miller and Arikan, 2004) but these shed in their findings little light on the
matter under examination in this thesis.
modelled through hazard rates) rather than on the fact of the actual value or effectiveness of an options strategy to the organisation.  

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248 The authors make an implicit value assumption that in most cases is not substantiated other than by the relationship suggested by real options theory. Measuring the buyout or exit itself as a dichotomous variable has little relationship with option value other the implied assumption that there is one (which is difficult to investigate in macro-level studies).

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**Exhibit 5: Empirical Investigations of Real Options**

<table>
<thead>
<tr>
<th>Author</th>
<th>Context</th>
<th>Uncertainty Proxy</th>
<th>N</th>
<th>Dependent Variable</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kogut (1991)</td>
<td>National (USA)</td>
<td>Indirect (Growth rate)</td>
<td>92</td>
<td>Exercise of option (divestment or acquisition)</td>
<td>Hazard rate</td>
</tr>
<tr>
<td>Campa (1994)</td>
<td>International</td>
<td>Volatility of the exchange rate</td>
<td>744/1080</td>
<td>Entry (1 or 0)</td>
<td>Logit Regression</td>
</tr>
<tr>
<td>Folta (1998)</td>
<td>National (USA)</td>
<td>26-week std. deviation of the log of (inflation adjusted) weekly returns of different industry stock price indices</td>
<td>420</td>
<td>Action taken on R&amp;D (Minority investment, joint venture, or acquisition)</td>
<td>Binomial and Multinomial logit regression model</td>
</tr>
<tr>
<td>Folta and Miller (2002)</td>
<td>National (USA)</td>
<td>26-week std. deviation of weekly returns of an industry index</td>
<td>285</td>
<td>Buyout</td>
<td>Hazard Rate</td>
</tr>
<tr>
<td>McGrath and Nerkar (2004)</td>
<td>Global firms</td>
<td>Indirect (Competition)</td>
<td>4013</td>
<td>Taking out patents (seen as options)</td>
<td>Proportional hazard Cox regression model</td>
</tr>
</tbody>
</table>

*Source: Own analysis*
Second, the comparison highlights the divergent measures used for uncertainty even in the few studies in the management field. While uncertainty as well as time to expiry are key value drivers and central pillars for real options, they have received insufficient attention in the analyses of the various studies. The classification of uncertainty into exogenous and endogenous factors appears to be by far the one most congruent with strategic real options thinking. However, empirical research on real options focuses almost exclusively on exogenous uncertainty.249

Critical discussions on real options research have pointed to the need to evaluate different types of uncertainty for the analysis of real options: (1) the ones that arise from strategic opportunities, where the resolution of uncertainty is mostly endogenous to the firms activities, and (2) others that are more concerned with the evaluation of investments in assets, for which the resolution of uncertainty is entirely exogenous to a firms actions.250 The two forms have different implications for real options. High endogenous uncertainty leads companies to invest more into exploration activities that can be discontinued or stepped up contingent on how the outlook develops.251 In contrast, high exogenous uncertainty encourages waiting, as the firm cannot change the outcome through more investment into learning activities.252

Even fewer studies have investigated portfolios of real options, which are severely under-researched. First results, although to be taken with caution, have been pointing to insufficient management capabilities to manage real options effectively,253 especially in the context of international investments. In their empirical study of downside risk254 implications of multinationality and international joint ventures, Reuer and Leiblein (2000: p.210) note that the results of their findings (that showed no positive effect of multinationality) “can be explained by the observation that not all investments undertaken in uncertain contexts provide significant options, nor do firms necessarily manage real options properly”.

Finally, the concentration of studies on firm’s home markets (almost all studies were concentrated on firms in the United States of America) or the options in global firms neglects the nuances of different market environments and the related

249 E.g. Folta (1998) notes the existence of endogenous uncertainty, but then does not include it in the empirical investigation; Folta and O’Brien (2004); this is also mentioned by Adner and Levinthal (2004: p.76).
250 See Adner and Levinthal, 2004: pp.77-78; McGrath, 1997.
254 Downside risk is defined as “a probability-weighted function of below-target performance outcomes.” (Reuer and Leiblein, 2000: p.203).
uncertainty. Foreign markets add an additional layer of endogenous uncertainty to the industry-specific uncertainty, particularly in the early phase of investment. This topic will be discussed below.

**Summary**
The common practice of ignoring endogenous uncertainty in the context of empirical investigations of real options could have perilous consequences for the development of the theory. There is a broad consensus in the literature on strategic real options that endogenous uncertainty is a fundamental component of uncertainty that influences the value of real options. While adequate proxies for endogenous factors might be not as obvious and established as the volatility of traded assets, this portion of uncertainty is clearly a key determinant that shapes how firms invest (a behavioural aspect) and has strong influence on the adequacy of the timing of investments (an optimality aspect).

### 2.3 Uncertainty

**Understanding Uncertainty**

‘Uncertainty’ is a broad term, which encompasses a multitude of concepts. Uncertainty may arise because of incomplete or conflicting information and commonly refers to unknown or unpredictable future developments. In the economic context, uncertainty can conceptually be seen as being composed of two principal elements: the first is downside-uncertainty (often referred to as risk, or chance of loss), where events have an adverse effect on results compared with expectations. The second is upside-uncertainty, where there is a positive surprise resulting in better than expected results. Knight (1921: p.44) notes that many classical authors distinguish between “uncertainty” and “risk” and the mathematical probability of loss” but then use uncertainty as a known quantity.

In the management literature, most authors use the terms risk and uncertainty interchangeably. Furthermore, authors also often conceptualise risk only as downside, not as potential upside. This, however, impedes the ability to view the positive side of uncertainty if the events turn out more favourable than expected. Uncertainty also has to be clearly distinguished from complexity, as uncertainty is

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256 See Duncan, 1972; Miles and Snow, 1978.
257 For an early discussion on risk and uncertainty see also Knight, 1921.
258 See Miller, 1992: p.311.
259 Such usage is widely spread. See, for example, Penrose, 1959: p.56.
future-oriented while complexity is more a present phenomenon. A further issue is that research discussing uncertainty has the tendency to isolate particular aspects of uncertainty (e.g. political or market uncertainty) to the exclusion of others. Little research so far integrates the broader uncertainty spectrum, in particular in environments beyond the more developed markets that firms encounter.

Some of the more holistic conceptualisations of uncertainty are portrayed below. Osborn et al. (1980) suggest that there are several dimensions of uncertainty: disparity (heterogeneity) and volatility, where the latter comprises the “rate of change (velocity), the degree of change (force), and the predictability of change (directional deviation).” These dimensions can be collapsed to two main aspects of uncertainty: the sources of uncertainty and the degree of uncertainty. To effectively manage uncertainty, it is important to clearly understand the different sources of uncertainty as well as the degree of uncertainty that the company encounters. The type of uncertainties involved will also have an effect on the type of strategic options available to a company. The uncertainty discussed in this dissertation refers to the uncertainty of the value represented by the discounted future cash flows (that the company’s decision makers encounter) based on an irreversible investment.

2.3.1 Degree of Uncertainty

To assess the degree of uncertainty for a given company, Courtney et al. (2000: pp.82-84) identify four different levels of uncertainty. First, a situation of clear enough future, where the residual uncertainty is irrelevant to making strategic decisions. Second, alternative futures, where the future can be described as one of a few discrete scenarios to which probabilities can be attached. Third, a range of potential futures, where a limited number of key variables define a range but the actual outcome may lie anywhere within it. Finally, true ambiguity, where a number of dimensions of uncertainty interact to create an environment that is virtually impossible to predict.

This categorisation is similar to the four cases distinguished by Keynes (1973), who considered uncertainty as a fundamentally endogenous concept based on logical relations between possible events:

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260 E.g. Lawrence and Lorsch (1967: p.29) use measures such as ‘clarity of information’, ‘uncertainty of causal relationships’, and ‘time span of definitive feedback’ as proxy for relative uncertainty in environmental sectors. Such constructs seem to capture more complexity than actual uncertainty about future outcomes.

261 See Miller, 1993: p.694.


264 ‘Irreversible’ as defined in Section 2.2.1.
(i) that there are no probabilities at all (fundamental uncertainty), (ii) that there may be some partial ordering of probable events but no cardinal numbers can be placed on them, (iii) that there may be numbers but they cannot be discovered from some reason, and (iv) that there may be numbers but they are difficult to discover.265

The independence of uncertainty sources is an important aspect of such considerations. Uncertainty sources that have opposing effects will reduce the overall impact on the volatility of future cash flows.

2.3.2 Sources of Uncertainty

Given the abstractness of the concept it is not surprising that there is so little consensus on its holistic properties of uncertainty and that many of the conceptualisations appear somewhat vague.266 Broadly speaking, uncertainty is often classified into internal and external factors.267

Duncan (1972: p.315) proposes to view uncertainty using factors and components comprising an organisation’s internal and external environment. The internal environment is composed of the organisational personnel component (relating to individuals), the organisational functional and staff units component (relating to organisational units), and the organisational level component (relating to corporate events). The external component includes the customer component, the supplier component, the competitor component, the socio-political component, and the technological component.

A framework of sources of uncertainty put forward by Wernerfelt and Karnani (1987: p.189) distinguishes between (in order of importance): demand uncertainty, supply uncertainty, competitive uncertainty and externalities. Demand uncertainty refers to uncertain expectations for the size of the market and its segments, the acceptance of product or service offerings by customers, and uncertainty about the appropriate distribution channels. Supply uncertainty can arise from internal operations as well as external factors. It relates to uncertainty about external factors such as change in input cost, development of technology, and internal factors such as the defection of key employees. Competitive uncertainty is a result of unpredictable circumstances and behaviour of competitors. Remaining

265 Rosser, 2001: p.559 (with a slightly rephrased, clearer phrasing of Keynes original statement).
267 For a more extensive review of literature discussing uncertainty refer to Jauch and Kraft, 1986: p.779.
externalities such as social pressure and government intervention (subsidies and similar measures) are considered a fourth source of uncertainty.

A comprehensive framework to assess sources of uncertainty by Miller (1992) classifies uncertainty into three broad categories: general environmental uncertainties, industry-specific uncertainties, and firm-specific uncertainties. These broad categories are further divided into explicit subcategories that can be used to assess and monitor sources of uncertainty (see Exhibit 6).²⁶⁸

**Exhibit 6: Uncertainty and its Components**

<table>
<thead>
<tr>
<th>General Environmental Uncertainty</th>
<th>Political</th>
<th>Terrorism, war, changes in government</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Government policy</td>
<td>Fiscal and monetary policies, trade restrictions, regulations affecting the business sector, tax policy</td>
</tr>
<tr>
<td></td>
<td>Macroeconomic</td>
<td>Exchange rates, interest rates, inflation, terms of trade</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>Social unrest, shift in social concerns</td>
</tr>
<tr>
<td></td>
<td>Natural</td>
<td>Variations in weather, natural disasters</td>
</tr>
<tr>
<td>Industry-Specific Uncertainties</td>
<td>Input market</td>
<td>Quality of inputs, supply relative to industry demand</td>
</tr>
<tr>
<td></td>
<td>Product market</td>
<td>Consumer preferences, market demand, availability of substitutes and complements</td>
</tr>
<tr>
<td></td>
<td>Competition</td>
<td>Pricing and other forms of rivalry, new entrants, product and process innovations, technological uncertainty</td>
</tr>
<tr>
<td>Firm-Specific Uncertainties</td>
<td>Operations</td>
<td>Labour relations, availability of inputs, production variability and downtime</td>
</tr>
<tr>
<td></td>
<td>Liability</td>
<td>Product liability, emission of pollutants</td>
</tr>
<tr>
<td></td>
<td>R&amp;D</td>
<td>R&amp;D activities, regulatory approval of new products</td>
</tr>
<tr>
<td></td>
<td>Credit and Fraud</td>
<td>Problems with collectibles, fraudulent behaviour of employees</td>
</tr>
<tr>
<td></td>
<td>Cultural</td>
<td>Cultural friction</td>
</tr>
</tbody>
</table>

Source: Amended and modified from Miller, 1992: pp.314-319

Dixit and Pindyck (1994) principally distinguish between two types of uncertainty: “aggregate uncertainty, that affects all firms in the industry, and firm-specific or idiosyncratic uncertainty facing each firm” (p.18). They also discuss a further aspect, the uncertainty over cost, which comprises two forms: input cost uncertainty and technical uncertainty.²⁶⁹ Input cost uncertainty is seen as exogenous and beyond the influence of the firm.²⁷⁰ Technical uncertainty is related to the expected costs and the probability of succeeding, which can be raised through investment. McGrath (1997: pp.976-977) adds a third form – external uncertainty – to this conceptualisation, where the “sources of uncertainty are largely ‘external’ to the firm (in other words, not technical in nature) but can be influenced by strategic action.”²⁷¹

²⁶⁸ For an alternative assessment of risk factors in international business in ten industries see Mascarenhas, 1982: pp.92-93.
²⁶⁹ See Dixit and Pindyck, 1994: pp.46-47.
²⁷⁰ See McGrath, 1997: p.977.
Folta (1998: pp.1010-1011), elaborating on a distinction introduced earlier by Bowman and Hurry (1993: p.767), suggests distinguishing between two forms of uncertainty: *endogenous* and *exogenous uncertainty*. Endogenous uncertainty can only be resolved by action. It involves learning and provides the opportunity to stop investing if the value of the project falls due to new insights or an exogenous shock. In contrast, exogenous uncertainty is predominantly resolved over time and largely unaffected by actions by a firm. It is mainly driven by factors such as random demand- and supply-side fluctuations and is a phenomenon that all market participants are unable to anticipate.

A typology suggested by Fischer (2002: p.82-85), which is closely related to the Dixit and Pindyck (1994) idea of firm-specific and industry-specific factors and includes Folta’s (1998) categorization, is also aimed at real options. It classifies uncertainty as either *influencable*, *partly influencable*, or *non-influencable*. Influencable uncertainty is seen as an endogenous (firm-specific) segment of uncertainty where the company has the power to affect and control the uncertainty (e.g. research and development projects). Partly influencable uncertainty is outside the exclusive control of the company, but is still to some degree influencable. It is industry-specific (or peer group specific) and relates to situations where exogenous developments can partly be influenced (e.g. through lobbying for technical standards and norms). Non-influencable uncertainty is an exogenous (industry-specific) factor that relates to ‘pure’ market uncertainty (e.g. change in input factor cost). Although it provides an interesting perspective, such a classification could prove difficult to put into practice, as the boundaries between the categories are fluid and the classes not measurable.

Uncertainty with regard to the prospects of a certain enterprise is ultimately a combined effect that is composed of a number of often inexplicably interwoven sources. As Bowman and Hurry (1993: p.767) note: “*Environmental* volatility is often a function of time for exogenous reasons (e.g. the velocity of changes in opportunities, see Bourgeois and Eisenhardt, 1988) and endogenous reasons related to the speed of organizational learning.” This form of categorising uncertainty has also developed into the consensus view in research on real options.

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274 This conceptualisation is somewhat related to the ideas of Penrose’s (1959: pp.61-62) discussion of ‘irreducible’ or ‘unavoidable’ uncertainty, but her view focuses more on the managerial reactions to uncertainty (particularly relating to the confidence of managers to expand their company) rather than the phenomenon itself.
275 Emphasis (marked by italics) in original.
2.3.3 Measurement of Uncertainty

Due to their broad classification, both endogenous and exogenous uncertainty are not readily measurable in practice. For the purpose of empirical investigation into the influence of the two factors on organisations, authors in management research tend to follow two main routes. The first, preferred by authors rooted in the social sciences field, is soliciting an assessment by managers on the type and degree of uncertainty they encounter.\(^{276}\) The second route, favoured by financial economists, is to find a reasonable observable proxy for the type of uncertainty under review.\(^{277}\) The first approach will naturally be focused more on endogenous factors, while the second will largely represent exogenous factors.

**Exogenous Uncertainty**

Exogenous uncertainty is most closely associated with unforeseeable events and developments in factor markets as well as the adaptation of technological innovation that lie beyond the influence of the firm.\(^{278}\) In spatial markets, exogenous uncertainty is influenced by factors such as the market growth rates (volatility is commonly related to the growth rate), industry-specific factors (e.g. industry cycles) and development stage (e.g. a larger number of entrants that are typically present in nascent industry environments, from both local and foreign firms).

Carruth *et al.* (2000: p.133) identify four main methodologies to approximate exogenous uncertainty affecting return on investment. First, the estimation of the marginal profitability of capital in order to infer the threshold level at which investment will be triggered. Second, computing the unconditional variance of a selected price or macroeconomic aggregate, which is assumed to influence returns (about which investors are uncertain).\(^{279}\) Third, the modelling of a stochastic process that determines the conditional variance of an aggregate measure (e.g. the price level of certain factors).\(^{280}\) Finally, in some cases it is possible to incorporate a somewhat more direct measure of uncertainty (e.g. the risk premium derived from the term structure of interest rates).

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\(^{276}\) E.g. Duncan, 1972; however, this does not yield the continuous measure needed for the evaluation of strategic real options.

\(^{277}\) See Carruth *et al.* (2001: p.132)

\(^{278}\) The characterisation used by McGrath (1997) and Folta (1998) will be used within this dissertation. Accordingly ‘endogenous’ uncertainty can only be resolved by action, while ‘exogenous’ uncertainty is largely resolved over time.

\(^{279}\) This is the approach taken in this dissertation. Neither of the other approaches appears feasible or sensible considering the limited data available and proposed modelled relationship as laid out in the hypothesis framework.

\(^{280}\) Such methods (e.g. ARCH or GARCH) are widely used in the finance literature for modelling volatility.
Endogenous Uncertainty

Endogenous uncertainty\(^{281}\) is unique to a certain perspective (e.g. a manager or firm) and can be reduced through the actions of a firm.\(^{282}\) It is caused by lacking knowledge about the environment and represents a ‘blurring lens’ that impedes the ability to recognise the true, exogenous uncertainty.\(^{283}\) While the information about the true distribution of returns (exogenous uncertainty) is accumulated over time,\(^{284}\) the endogenous uncertainty distribution represents a snapshot based on current knowledge. As March (1991: p.72) notes, the situation is complicated as probability distributions may not be stable and depend on choices made by other participants. “Increased knowledge seems often to reduce the variability of performance rather than to increase it” – it makes performance more reliable.\(^{285}\)

The knowledge deficit (unfamiliarity) compared to other market participants creates a noise,\(^{286}\) which is the main source of endogenous uncertainty. A lack of information – and higher endogenous uncertainty as a consequence – is, however, foremost a downside-uncertainty which results in misjudgement and mistakes in strategic decision-making. This misjudgement of opportunities (based on endogenous uncertainty) will inevitably lead to lost value, as acting on wrong information can never exceed the true value (based on exogenous uncertainty).\(^{287}\)

Endogenous uncertainty can be narrowed through learning and experience\(^{288}\) up to a certain level, which represents the boundary between endogenous and exogenous uncertainty. As endogenous uncertainty is based on changing environment factors it can never be fully eliminated. This boundary is fluid and can be moved if a firm acquires proprietary information on future developments. At this moment the information gained about these future developments turns from exogenous to endogenous uncertainty for other participants who do not hold this knowledge. This process sharpens the knowledge about the statistical parameters of future cash flows for the company with the proprietary information.

\(^{281}\) Penrose (1959: p.58) also uses the term subjective uncertainty, as referring to “the feeling that one has too little information” which can lead “to a lack of confidence in the soundness of the judgements that lie behind any given plan of action”.

\(^{282}\) Ultimately, of course, employees; examples include market research and ‘sense-making’ (Weick, 1979).


\(^{284}\) See March, 1991: p.72.


\(^{286}\) See Bernardo and Chowdhry, 2002: p.229.

\(^{287}\) This is independent of the result of calculations that might have been made (which are in any case prone to modelling errors) to assess the value of the options.

The effect of this is twofold: first, endogenous uncertainty is reduced as a company learns more about its environment; second, a company can wait until certain events have taken place (discrete-event uncertainty; or ‘signals’) or the underlying business developments have become more favourable (continuous uncertainty). As endogenous uncertainty naturally contains less upside, this results in a downward bias of the overall probability distribution of future returns. In mathematical terms relevant to modelling uncertainty, the reduction of endogenous uncertainty (e.g. through relevant experience) means that the standard error of estimates of exogenous uncertainty is likely to be reduced. With greater knowledge and reduced endogenous uncertainty, the variance equally would be reduced. In an ideal case, where the error between the endogenous uncertainty and exogenous uncertainty is relatively small, the assessment of the level of uncertainty approximates the exogenous uncertainty in both statistical parameters – the mean value (μ) and the variance (σ²). As (relevant) knowledge about the local market environment is inversely related to uncertainty, it can be seen as a key measure to approximate the firm-specific endogenous uncertainty.

Uncertainty in Foreign Expansion
Endogenous uncertainty will be substantially elevated in a foreign entry situation and exogenous uncertainty is likely to be dramatically higher where the economic environment is immature. As a result, an MNC (with its global headquarters in a developed market) entering an emerging market environment is likely to be confronted with a higher degree of uncertainty compared to developed markets. The sources and the degree of uncertainty will also be different for different companies.

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289 See Bowman and Hurry, 1993: p.769.
290 If opportunities are visible to other market participants who act on such information (similar to the efficient market hypothesis in financial economics theory), this leaves more downside surprises.
292 This assumes that the distribution of future cash flows is known.
In the international management literature, endogenous uncertainty is seen as a mostly reversible knowledge deficit. Researchers in the international management field agree that “with increased experience, firms perceive less uncertainty and become more confident of their ability to correctly estimate risks and returns and manage foreign operations.” These observations in the literature on foreign entry suggest that endogenous uncertainty is highest at the time of entry and then – as a central tendency – recedes over time as companies become more familiar with their environment. Such a trend is consistent with many related ideas in the literature on topics such as the cultural distance in international expansion, the liability of foreignness and the learning curve. The conclusions reached in those research streams imply that learning is not a linear function of time and action but that it will encounter decreasing marginal returns over time.

**Summary**

The categorisation into exogenous and endogenous factors has evolved as the acknowledged standard for viewing uncertainty for capital investments. However, this leaves a relatively abstract concept that is more appropriate for academic enquiry and might be difficult to use by managers. A further decomposition of uncertainty with clearer sub-categories could provide a more valuable instrument for strategic analysis. For exogenous uncertainty, an approximation using industry-specific (unconditional) variance estimations appears the most appropriate method for strategic real options in a foreign market environment. For endogenous uncertainty, although no established measure exists, an inverted experience measure appears the most adequate approximation in a foreign expansion context.

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296 Chang and Rosenzweig, 2001: p.748, citing three other studies in the field (including Johanson and Vahlne, 1977).

297 See, for example, Barkema, Bell and Pennings, 1996.

298 See, for example, Hymer, 1960; Zaheer, 1995.

299 See, for example, Boston Consulting Group, 1972; Yelle, 1979.

300 Such statement is based on the argument that once the uncertainty about relatively simple aspects of the environment (that are easy to understand) is resolved, incremental insights become more expensive, and understanding everything that is responsible for influencing future cash flows is right-out impossible in normal business situations. Furthermore, in an environment that changes, learning can only follow.

301 Measurement, as Carruth et al. (2000) note, is still problematic and “there is considerable debate about how best to proxy uncertainty […] with a myriad of possible measures constructed in a number of different ways being utilised in the extant literature.”
3 Conceptual Framework

Extension of Existing Theory on Two Main Dimensions
The conceptual framework expands the existing theory by weaving together theory-based conclusions from several research streams. The thesis endeavours to extend the international management literature on two dimensions: establishing a dynamic perspective for subsidiary development and a portfolio perspective for subsidiary groups. Studying the development of subsidiaries over time marks a departure to the relatively static conceptualisation of subsidiary role prevalent in strategic and international management research. The scope of analysis will be widened from the ‘single subsidiary’ as the principal unit of analysis to subsidiary groups on a country level, an area which to date has been the subject of little attention.

Subsidiaries as Strategic Real Options
A central idea behind the following analysis is that subsidiaries can be seen as strategic real options to the parent MNCs. Similar to financial options a strategic real option can be exercised, abandoned or held on to. Such a conceptualisation can provide a number of important insights as well as a more dynamic and holistic view of subsidiary development. Discussion of the literature above has helped to develop a clear understanding of both endogenous and exogenous uncertainty in foreign markets that reflects the difference between real and financial options. To understand organisational effects, the focus of analysis is then shifted to subsidiary groups.

The Mode of Analysis
The following sections develop an options-based management framework that is, in some elements, focused on foreign markets. Options can be classified along three dimensions: vertical classes (country-level, subsidiary-level, operating-level options), scaling-types (option to grow, option to learn, option to abandon), and effect-based categories (capacity and ownership options). Understanding these dimensions allows framing subsidiary development from an options perspective. This is then carried

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303 Conventional frameworks reviewing the different strategic roles of subsidiaries often do not consider country or regional coordination needs with regard to corporate development and share a relatively static touch. This shortcoming is particularly evident in emerging market environments, where such activities are even more essential due to a higher level of uncertainty and requirements for fast decision-making.  
304 This is somewhat related to the conceptualisation of venture capital investment by Hurry, Miller and Bowman (1992). As Reuer and Leiblein (2000: p.211) note for viewing joint ventures as options, this rests on the assumption that “parent firms do not experience large recurring costs” – other than a subsequent capital investment to expand (or abandon) operations (de facto exercising the option).
further to portfolios of strategic options. Detailed research questions, hypotheses and propositions are derived from these considerations.

3.1 Vertical Classes of Strategic Real Options

Strategic real options exist in various forms and areas within an MNC. Conceptually, strategic options can be allocated to three distinct layers within an international organisation (a vertical view): on the country-level, subsidiary-level and operational-level (see Exhibit 7 for a graphical depiction). Each of the described classes of options has somewhat different characteristics.

<table>
<thead>
<tr>
<th>Exhibit 7: Distinct Layers of Strategic Real Options in MNCs</th>
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<table>
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<th>Strategic Real Options</th>
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<tr>
<td>Country-level</td>
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<td>Subsidiary-level</td>
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<td>Operational-level</td>
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3.1.1 Country-Level Options

At the country level, especially in a regional context, there often exists inter-country flexibility (e.g. to switch production to another country) and arbitrage opportunity (e.g. through natural resource price differentials) as each country provides strategic real options to an MNC.\textsuperscript{305} From an international management view, Bartlett (1990: p.55) sees the exploitation of strategic options as equivalent to competitive advantage, where variance implies profit opportunities.

3.1.2 Subsidiary-Level Options

It is argued that on the subsidiary level, each foreign manufacturing subsidiary (a legal entity, typically comprising a business activity in a single field in their early stage) can be seen as a strategic real option (to grow, learn or abandon). Manufacturing subsidiaries can be conceptualised as options to the country or overseas headquarters if the level of uncertainty is high. They typically present an option to expand operations through follow-on investment (options to grow) as a response to demand growth. Alternatively, they can be shut down and liquidated if the environment is developing in an unfavourable way (abandoning the option). Finally, firms are often in position to postpone irreversible decisions (on further investment commitments or divestment) to a point when the future prospects become clearer (option to wait). In some cases it would also be possible to view the investment in sales subsidiaries as a strategic real option. This would be both a question of the degree of irreversibility of the investment as well as how substantial the investment is.

3.1.3 Operating-Level Options

At the operating-level, real options are created and exercised on a project basis. This is a subject that is widely discussed in the literature and comprises operating applications of real options in projects of less strategic nature (such as in research and development projects; see also Section 2.2.1).

Summary of the Vertical Classes of Options

The insights derived from this conceptual separation of these three layers of strategic real options facilitate the analysis of the organisational consequences of exercising options. Decisions depending on the level of analysis will have a sharply different magnitude in effect on the overall firm. Whereas, for example, the abandonment of an unprofitable low-profile product line (an operating-level real option) will likely have little effect on the overall organisation (country group or corporate level).

306 See Kogut, 1991; Hurry, Miller, and Bowman, 1992: p.96; Miller and Folta, 2002; e.g. as a growth option which is exercised when the market has reached a certain minimum size threshold.
307 The subsidiary as strategic real option will be discussed in more detail in Section 3.4.1.
308 As suggested by Kogut and Kulatilaka (2001: p.745) in the context of capability building. Sales subsidiaries are not further explored in this dissertation, as their assessment is not as clear.
309 China for a long time would only grant business licenses to ‘manufacturing’ enterprises (the term ‘manufacturing’ was often interpreted relatively widely in China and could, for example, also be applied to repackaging of products), which seem better suited for option analysis as the capital commitment is often both higher and more irreversible.
311 See Dixit and Pindyck, 1994; Trigeorgis, 1996; Amram and Kulatilaka, 1999; Copeland and Antikarov, 2001.
organisation) and might not even be noticed by stakeholders (as it is mostly internal), the abandonment of a subsidiary (a legal entity) is likely to cause an adverse reaction from internal and external stakeholders (e.g. demonstrations by laid off employees, a deteriorating relationship with government authorities, etc.). Thus, from an organisational point of view, the three types of options have to be treated differently. This study will focus exclusively on subsidiary-level options.

3.2 Scaling-Types of Strategic Real Options

A subsidiary can represent three scaling-types of strategic real options: the option to grow, to learn and to abandon. These are characterised by the direction of scaling: scaling up (of capacity or ownership) in the case of growth option, sideways development (postponement of a decision) in the case of the option to learn, and scaling down (of capacity or ownership) in the case of the abandonment of an option. While the option to grow and the option to abandon are actionable decisions, the option to learn is a complementary option (always accompanied by at least one other option) that requires clear recognition and definition of the connected options (to grow or to abandon).

3.2.1 Option to Grow

An option to grow is the right to expand business activities (e.g. through an increase in manufacturing capacity or an acquisition of a rival firm) or ownership (full or partial buy-out of a partner) through a fixed investment where the net value (also commonly referred to as ‘payoff’) is contingent upon one or multiple sources of uncertainty. The basis of this option is a resource or dynamic capability in combination with a platform to implement it. This platform is provided by a subsidiary, which has the capacity to use this transferred or self-developed resource or capability.

Growth options are subject to a number of natural boundary conditions that set limits on the potential magnitude of the underlying variance of the option payoff. If such natural boundary conditions are understood, they can often be altered (e.g. through an amplifying pre-investments or the deployment of idiosyncratic endowments) in order to enhance the option value.

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312 Such reactions have been relatively common in countries like China, but also elsewhere when foreign companies are involved in the development of a country’s economy and then decide to pull out (fully or partially). The difference between ‘operating-level’ and ‘subsidiary-level’ options will become clearer in the next section.

313 See McGrath, 1997: p.980.
Boundary Conditions for the Option to Grow

The boundary conditions for subsidiary-level options can be defined by internal and external factors. The internal factors are mostly connected to resource availability (e.g. capital) and managerial discretion to allocate resources. External factors are embedded in a network of external stakeholders. To execute an option to grow it is often necessary to create prerequisite conditions for the expansion, such as for example to receive the necessary permits from relevant government authorities, which can take a long time and can be expensive to obtain and maintain (thereby increasing the cost of the option).³¹⁴

The process of developing options to grow often requires firms to establish relationships with communities, government officials, and in some cases suppliers and joint venture partners, who might spend resources in planning and coordination.³¹⁵ Although obtained on a tentative basis, such relationships create expectations. If these expectations are disappointed, the reputation might be damaged with a detrimental effect upon future undertakings.³¹⁶ The level of damage will depend on the standards of the market environment, the level of accumulated goodwill and how common such behaviour is in this context.

Competition is also a major factor that affects the value of growth options.³¹⁷ As Bowman and Hurry (1993) note, if a firm does not continuously monitor and act on opportunities, competitors will swiftly erode most of the option value. This, however, will depend on how unique the resources and capabilities are that are the basis for the option. The scarcity of these resources and capabilities inherent in a subsidiary will determine the degree to which they can serve as an entry barrier.³¹⁸ The effect of entry barriers on the level of uncertainty will be decisive for the value of the strategic real options available to the holding company.³¹⁹

³¹⁴ Another common prerequisite condition is the additional spare land or factory space.
³¹⁷ See Kester, 1984.
³¹⁸ E.g. the business licence granted to Volkswagen (in return for technology transfer) and the favourable standing of its partner with almost proprietary access to China’s market for a number of years created effective entry barriers to its competitors. Whereas other companies were also able to establish joint ventures in the automobile industry in China, their partners proved to be inferior - often leading to immense losses (two other early foreign companies failed to make a successful entry: Beijing Jeep incurred losses for almost 20 years, Peugeot exited its failed joint venture after a long struggle).
3.2.2 Option to Learn

The option to learn (or defer) refers to the possibility to postpone a decision until more has been learned (both through the passage of time or through action) in order to resolve some uncertainty and to shore up knowledge. There is no direct equivalent for this option type in the financial economic literature – as its existence is based on endogenous uncertainty – but it can be characterised as ‘holding the growth option’. This option can have tremendous value and can help to avoid pursuing the wrong path until a decision has to be made. As Adner and Levinthal (2004: p.77) note, the option to learn can open manifold opportunities:

Experiments, even unsuccessful ones, not only provide information about intended investment paths but also provide information about other possibilities – possibilities that may not even have been envisioned at the time of the initial investments.

A firm’s absorptive capacity, “the ability of a firm to recognize the value of new, external information, assimilate it and apply it to commercial ends”320 is one of the most valuable capabilities in dynamically-competitive market environments.321 This is particularly the case for companies entering foreign markets, where the rules of engagement can be fundamentally different in many aspects and opacity is often much higher. Hence, the way learning (in the meaning of knowledge acquisition) is organised is of utmost importance to the success rate of the firm.322 Besides path-dependent focused incremental search activities,323 learning and the reduction of endogenous uncertainty can yield additional unexpected benefits by uncovering new business opportunities or further strategic options.

Boundary Conditions for the Option to Learn

Options inevitably bring opportunity cost.324 If an option is exercised the holder loses flexibility, if not he might sacrifice potential cash flows. There is also a point where learning encounters a certain threshold level at which the cost of additional knowledge exceeds the potential benefits of this acquired knowledge. Similarly, the option to learn can be expensive if, for example, a subsidiary is incurring substantial losses. Holding on to commercially non-viable options to learn (i.e. subsidiaries)

322 See Li, 1995: p.347.
324 See Dixit and Pindyck, 1994: pp.6-7
hence seems inappropriate unless the value of the intrinsic growth option(s) is higher. The cost of such learning initiatives (e.g. subsidiaries or, for operation-level real options, R&D projects) can be direct or indirect. Direct costs include, for example, financial cost for market research or learning-by-doing (e.g. through learning in subsidiaries). Indirect costs arise through increasing complexity with many learning initiatives to coordinate.325

**Hysteresis**

Companies are bound by their past, through existing routines and sunk cost, which influence their reaction to environmental changes.326 Hysteresis, which is defined as “the failure of an effect to reverse itself as its underlying cause is reversed”,327 is one of the most important factors for entry and exit decisions under uncertainty. Put differently, high costs of changing the organisational set-up of technology and human resources (or ‘coupling’) leads to a form of inertia that keeps firms in a sub-optimal stage (based on the recommendation of net present value) although disruptive exogenous factors would call for an overhaul of the organisation.328 The degree of irreversibility also influences the timing of investment decision as it raises the threshold-level necessary before investment will take place.329 Real options theory suggests that inertia is not necessarily the consequence of myopia but is sensitive to environmental volatility and firm competences.330 Consequently, firms delay action – until the course of development is sufficiently clear – before investing in or divesting fixed assets.

This creates a certain hysteresis band,331 deviations into sub-optimal states, where managers hesitate to change course in a radical way, hoping that future developments might provide a more appealing environment.332 Thus, there are situations in the entry process – e.g. when the outlook has moved only slightly into the positive or negative terrain – where it would be optimal to expand or abandon a

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325 See Kemna, 1993.
331 An example made by Brennan and Schwartz (1985: p.149) calculates how far the price of copper would have to fall before a currently open mine would have to close or a currently closed mine would be profitable to open. The authors made assumptions about the fixed and variable costs of a operating mine and found that it would be optimal to close an open mine if the price of copper reached $0.40 per pound and to open a closed mine if the price of copper reached $0.80 per pound. Surprising here, assuming that the parameters used by Brennan and Schwartz (1985) are plausible, is the wide range of this hysteresis band.
subsidiary but the ‘transaction cost’ for executing it is too high. As a result firms tend to ‘learn’ longer than necessary.

3.2.3 Option to Abandon
An option to abandon, in this context, is the right to liquidate or sell a subsidiary (or part thereof). The value of an option to abandon is the value differential between the proceeds of selling or cost of shutting down a project or firm and its discounted cash flow value.333

Boundary Conditions of the Option to Abandon
The potential internal effects, where an option to abandon a subsidiary looms, can include the lack of commitment by the workforce in response to a perceived lack of organisational commitment.334 The abandonment of a subsidiary might also be more difficult as it can result in more overall organisational collateral damage and requires laying off employees, which could send a negative signal to internal as well as external stakeholders. The ‘human factor’, as Carr (2003: p.22) notes, can make it very difficult to terminate projects even when no economic rationale exists to prolong an undertaking. Managers who find themselves in a position of ‘being part of an option’ will naturally resist such an undertaking even if they were to support the rationale if they would ‘hold the option’ themselves.335 In consequence of such human opposition, a highly flexible organisation composed of real options might lead to higher cost, increased employee turnover, and lack of focus.336

The potential external effects of an options approach to subsidiary management include a damaged reputation with external stakeholders (such as partners, suppliers, customers and government officials) when options are abandoned or if expectations with regard to plant expansions are not met.337 Furthermore, while the commitment to a subsidiary is a signal that a company is willing to fight for the market and therewith deters competitive entry,338 the lack of commitment (which can be the result of emphasizing the option to abandon) might open up the field to new entrants.339

333 The option to abandon is here seen as selling or salvaging the option to grow represented by the subsidiary.
335 See Adner and Levinthal, 2004: p.80.
336 See Das and Elango, 1995.
Barriers to Abandonment

Porter (1976: p.21) highlights three categories of exit barriers that can prevent companies from abandoning businesses: (1) structural (and economic) exit barriers, (2) corporate strategy exit barriers, and (3) managerial exit barriers. The existence of these barriers might also help to explain the perceived gap between potential and actual flexibility found in earlier studies of international ventures.340

Structural exit barriers include specialised assets, characteristics of technology, working capital or fixed assets that impede exit. Such barriers can also include intangible assets such as brand names, operating capabilities, or distribution agreements. Such factors lower the recovery value of a failed subsidiary (i.e. higher irreversibility).

Corporate strategy exit barriers are created in situations where relationships between the subsidiary under review and other businesses exist that deter an exit. Sharing of overhead, such as shared distribution channels or joint venture partners, are reasons that deter companies from abandoning certain subsidiaries even if they are unprofitable by themselves.341 Moreover, a company’s integration in a social and economic network is an important factor. Reputation, particularly in many countries in Asia, is a very important asset and the basis for business relationships.342 Abandonment of subsidiaries, especially in culturally collectivist environments, might lead to a loss of reputation that could affect the many other companies in a subsidiary group.344

Managerial exit barriers are a result of a company’s decision-making process. Typical examples include information-related barriers (not enough data to decide), conflicting goals (e.g. divergent managerial incentive structure),345 but can also include behavioural bias. The option to abandon is subject to many behavioural biases in organisations. The tendency of organisations to avoid abandonment even in clear-cut cases of failure has been largely attributed to psychological factors in the

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341 For example, having two or more joint ventures with one partner can lead to a situation where one clearly unprofitable subsidiary which is still important to the partner is not abandoned due to the complications that might arise in the other shared businesses. Similarly, a joint venture with a key customer can have strategic rather than operating value.
344 This relation is likely to be aggravated with increasing size (in terms of sales and employees) of a subsidiary, where the options to abandon are less likely to be exercised due to the higher ‘endowment’ with human capital (Mata and Portugal, 2000: p.551). At some point, the subsidiary is then ‘too big to fail’ de facto eliminating the option to abandon. Real options would, however, exist at a lower, operating-level within that subsidiary.
management of MNCs. These include the difficulty of firms to accept the logic of sunk costs\(^{346}\) as well as overconfidence in planning.\(^{347}\) A further factor potentially influencing managerial decision-making is the ‘endowment effect’.\(^{348}\) This theory implies that managers would tend to avoid abandoning subsidiaries where considerable effort has been spent, leading to a status quo bias.

Of all options, the decision to abandon an option appears to be the most difficult to take for managers. The literature concerning abandonment of subsidiaries goes back to Robichek and Van Horne (1969) but the interest in abandonment has always been much stronger in the financial economics research than in other literature streams.\(^{349}\) The lack of interest of management research in this topic might, according to Busby and Pitts (1997: p.180), also be explained by the fact that organisationally, abandonment is seen as defeatist.

### 3.3 Effect-Based Categories of Strategic Real Options

There are also two distinct categories of strategic real options at the subsidiary-level: capacity options and ownership options. These strategic real options – often mistakenly treated in the same way – are based on different economic considerations. The following definitions will discuss the differences.

#### 3.3.1 Capacity Options

A capacity option refers to the ability of a company to change the capacity level of a subsidiary (\(e.g.\) by building an additional production line) at a future point in time (flexibility criterion) and where the payoff of that decision is subject to uncertainty.\(^{350}\)

It includes increasing capacity for both existing products (escalating economies of scale) and new products (escalating economies of scope, using the same platform).

In manufacturing companies, which are the focus of this study, such investment in additional capacity typically requires substantial capital expenditure that constitutes to a large degree sunk cost (irreversibility criterion). Capacity options for subsidiaries are mostly affected by sudden changes in market demand or regulatory changes (uncertainty criterion). Capacity options that relate to a

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\(^{347}\) See Kahneman and Lovallo, 1993.


\(^{349}\) See Busby and Pitts, 1997: p.180

\(^{350}\) The term ‘capacity options’ in this dissertation refers to the capacity to increase sales as a result of investment in fixed assets. While the primary application is production capacity, it might also include areas such as expansion of distribution capabilities (or similar functions) as long as they constitute irreversible investment.
substantial expansion of existing operations qualify as a strategic real option to the parent organisation. Uncertainty here is concentrated on the cash flow return of a capacity expansion (for growth options). The exercise price (i.e. the cost to build the capacity) might also change, but is often found to be less volatile than the expected revenue development associated with investment. Capacity options are often seen as perpetual options with no set expiry date (T). From a valuation perspective a clear expiry date is critical, but from a strategy perspective a fading option can be very intuitive. Ultimately, there will often be an expiry date as competitive advantage is generally only of temporary value and other contextual factors (such as a window of opportunity for investment) might change to create barriers for new investment.351 Uncertainty with regard to capacity – measured as volatility (σ) of the payoff resulting from the exercise of the option – is shaped by both exogenous uncertainty and endogenous uncertainty. Holding and not exercising capacity options might also lead to foregone profits (dividends in real option terms) that affect the value of the option.

3.3.2 Ownership Options

Ownership options mostly appear where the company is co-investing with a partner in a joint venture.352 Selling a wholly-owned subsidiary to a third party might also constitute a vague put option (to cap losses), but is unlikely to have a positive value as such a transaction on market terms would likely be close to the fair value (or even below).

Ownership options in joint venture situations allow testing of partners and committing only part of the total capitalisation of a venture.353 Only a full buy-out or full divestiture constitutes an ownership option as these two alternatives are – compared to a partial transaction – costly to reverse (irreversibility criterion).354 It is a binding enterprise where it is not clear how the co-operation will develop (uncertainty criterion) but the owners have the managerial discretion to buy-out or terminate the undertaking (flexibility criterion). These characteristics constitute a strategic real option.

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351 Unless a new competitive advantage is introduced.
352 See, for example, Kogut, 1991.
353 This process is similar to the syndication of investments for first round venture capital investments. This first round investment is a device to obtain information that forms the basis for the decision whether to invest in risky firms. See Gompers and Lerner, 1999: p.200.
354 Mata and Portugal (2000: p.549) found that MNCs were more likely to be shut down than to be divested greenfield subsidiaries (compared to acquisitions). This implies that wholly-owned enterprises would – to protect the capabilities and technology – also likely be abandoned without profit than to provide such resources to potential competitors. This would leave no option value.
The ownership option is exposed to uncertainty from two principal sources that determine the value: first, the pure business component, the prospects of the joint venture based on future cash flow returns – contingent on the company’s economic success. Second, the partner component, the prospects that sharing the undertaking with a partner will add rather than destroy value – contingent on partner’s personality, capabilities and power network. The uncertainty related to the partner is typically highest in the beginning of the co-operation and is mostly composed of endogenous uncertainty.

The buy-out of a joint venture partner is, as Bowman and Moskowitz (2001: p.776) rightly note, in most cases not the exercise of an option per se, as the price is typically not fixed in advance but the result of negotiations. However, it is likely that the two sides will value the stake to be bought out differently: beyond the operating value the buyer will acquire more flexibility through full control of the entity. If this control premium is not paid for, the difference between the two value perceptions reflects the value of the option. It is also only then – if the value assessments of buyer and seller diverge positively – that the ownership option (without an a priori fixed price) has value.355

Uncertainty with regard to ownership options, particularly for the ownership call option, is predominately endogenous (largely resolvable through learning, such as understanding the partner), although exogenous factors will play a role with regard to the underlying value. Endogenous uncertainty will be reduced somewhat differently for ownership options compared to capacity options, as some aspects – such as local market knowledge – will be more useful to share among subsidiary group companies than other aspects that are specific to a particular joint venture partner. However, the principle that longer experience should – on average – be accompanied by less endogenous uncertainty remains intact.

Ownership options often have a predetermined expiry date. Joint venture contracts (e.g. in the case of China) are sometimes limited to a certain time period (e.g. 50 years) after which the business would either be bought out by one of the partners or dissolved. The average life span of joint ventures, due to different interests at work, is in practice considerably shorter, often forcing a premature exercise of ownership options once endogenous uncertainty is resolved.

3.4 Applying Options-Thinking to Subsidiary Development

3.4.1 The Subsidiary as Strategic Real Option

A number of authors in the strategic and international management field have noted that it can be favourable to start small and explore, which would be consistent with an option-based management approach. However, the empirical support for this statement has so far been missing. Furthermore, most of these studies neglect to provide a systematic framework that takes the level of uncertainty into account as a critical moderating factor. Uncertainty is a fundamental aspect of the real options theory that has implications for the optimal size of present and future investments in subsidiaries.

A subsidiary in foreign markets satisfies all necessary conditions to qualify as a real option. First, the investment in a manufacturing subsidiary can be seen as irreversible by real option standards. The invested assets cannot be easily recovered through an immediate sale, or only for a substantial discount. Second, there is considerable uncertainty about the future returns of the venture in a foreign market. This is particularly the case for developing countries with a high degree of opacity and environmental uncertainty. And, finally, management has the discretion to decide on the development of the subsidiary: whether to exercise the option to grow (capacity or ownership), to abandon it, or to wait and learn until endogenous uncertainty has been substantially reduced.

Entry and Expansion Strategies

There are two principal strategies for entering foreign markets under a high level of uncertainty: the first one can be characterised as a ‘Big Bet’ strategy, one (or a few) large investment(s) under high uncertainty that emphasise commitment and economies of scale (see Exhibit 8). Big Bets are in a way ‘premature strikes’, which are, as Bowman and Hurry (1993: p.768) note, “likely to yield the lowest performance because neither the opportunity nor the knowledge (i.e., accumulated learning) may have had a chance to develop”. The second is an options strategy of small investments that emphasises flexible scaling and spreading resources over a number of smaller subsidiaries. It is motivated by growth options and the option to learn.

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357 See, for example, Hurry, 1994: p.240.
358 See Rivoli and Salorio (1996) for a discussion of reversibility of real options in foreign direct investment.
A subsidiary with a small relative investment size is only sensible when the level of uncertainty is high (then classified as an ‘Option’). When uncertainty is low, companies are better positioned to emphasise ‘Commitment’ though larger investments. However, in this situation the strategic real options have little value in relation to the overall value of the subsidiary.

Where companies are making a structural mistake, as this thesis argues, is when they create a mismatch between investment exposure and the level of uncertainty - by expanding through Big Bets (high uncertainty, high investment) or creating an ‘Orphan’, a small investment when uncertainty is low. A Big Bet anticipates anticipate future demand that is subject to uncertainty, and forgoes flexibility gained through postponement of incremental investment decisions. If the anticipated maximum market growth is already included in the initial investment this leaves no room for a capacity option to expand. Orphan subsidiaries similarly fail to realise value potential through under-scaling of activities. If there is low uncertainty, there is also low potential upside and will likely attract little managerial attention at the parent firm. An under-sized investment with no realistic opportunity to grow adds primarily complexity to a foreign operation and should be combined with a more promising subsidiary. Consequently, both - Big Bet and Orphan - investment profiles are sub-optimal strategic postures based on real option

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361 See Johanson and Vahlne (1977: p.30) who note (based on their case studies) that the optimal scale of operations can be determined in the beginning in relatively stable and homogeneous markets.

362 It is evident that large investment can also contain options, but they do not fit the characterisation of being ‘an option’ themselves.
considerations. In contrast, the Option and Commitment postures both follow the logic of structural response to uncertainty.

The degree of uncertainty changes and, as a direct consequence, the options landscape changes as well. Consequently, such a characterisation cannot be static. A Big Bet investment might evolve into a Commitment investment if it succeeds in instantly lowering the level of uncertainty. On the contrary, a large number of Option investments by rivals might lead to an increased level of uncertainty – while simultaneously decreasing the average expected value. Some options will be exercised, other options abandoned. As a result, the types and number of strategic options contained in a subsidiary are also likely to be different over the development cycle of the subsidiaries.

**Environment, Strategy and Structure**

The environment-strategy-structure relationship\(^{363}\) is at the core of the conceptual framework. The environment – here, in particular, environmental dynamics characterised by the degree of uncertainty – influences the strategy that in turn determines the organisational structure. The organisational structure has two main components that are relevant from a strategic options perspective: the resource structure (investment) and the managerial structure (governance).

Both components determine the degree of flexibility available to the organisation. Part of an options approach is therefore also the organisational implementation of flexibility. Different levels of uncertainty require different mandates and governance regimes for subsidiaries. Research on learning and management of innovation, a somewhat related discipline, has shown that highly exploratory learning initiatives are more effective in highly autonomous management modes (with regard to goals and supervision).\(^{364}\) These aspects will be addressed in the empirical investigation.

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\(^{363}\) See, for example, Chandler, 1962; Lawrence and Lorsch, 1967; Bartlett and Ghoshal, 1998. p.60.

\(^{364}\) See McGrath, 2001.
3.4.2 A Portfolio Perspective for Strategic Real Options

Within-country expansion provides companies not only with cash flow streams of single subsidiaries, but also with ‘economies of scale’ from sharing common resources and knowledge across the group. The option to grow is at the centre of such considerations, while the abandonment or holding of the growth option are strategic alternatives.

Management’s objective from a shareholder value perspective is to maximise the expected value of the firm’s local operations, by choosing the appropriate growth strategy. While real option theory has so far been mostly applied as a decision-making tool for project evaluation and mental mode for managers in operational decisions, the previous section has built the case for considering entire subsidiaries (joint ventures or wholly owned legal entities) as strategic real options for the MNC’s headquarters.

The Subsidiary Group as a Portfolio of Strategic Options

Both the strategic and international management literature as well as the real options literature agree with the logic that uncertain environments require requisite variety and managerial flexibility. Structure is an important element of such a strategy that emphasises flexibility. One particularly effective way to structure a more flexible organisation, it is argued here, is to create a portfolio of strategic real options to counter exogenous and endogenous uncertainty.

A portfolio of subsidiaries addresses uncertainty at two ends: it maximises opportunities through multiple investment platforms, and it hedges against failures. The research on such structures is still at a nascent stage and mostly of conceptual nature. While portfolio theory appears to suggest that diversification of investment in different companies should have a positive effect on the portfolio (if the investments have independent return profiles), it is not clear to what degree

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365 See Penrose, 1959: p.92 – e.g. ‘managerial economies’ such as marketing, financial, and planning.
367 See Bowman and Moskowitz, 2001: p.772.
372 See Markowitz, 1959.
other effects, such as the governance cost resulting from increasing complexity,\textsuperscript{373} are detrimental to the overall value. Keeping options open entails both financial as well as organisational holding cost.\textsuperscript{374}

However, the analogy of a portfolio of strategic real options to a portfolio of subsidiaries adds important insights to the management in highly uncertain markets. Investing in only one large subsidiary under high uncertainty results in less options, compared to investing in a larger number of small subsidiaries, which provide more strategic flexibility.\textsuperscript{375} Such an approach is similar to the venture capitalist view, in which staged capital commitment is valuable to the investors because it preserves the possibility of abandoning a subsidiary.\textsuperscript{376}

An options approach would imply that MNCs systematically use small ‘learning ventures’, experimental probes to gather information, to expand them when they are successful or abandon them if they fail.\textsuperscript{377} It is, however, critical to note that only the subsidiaries that add substantial option value to the overall group should be established and expanded. It is also clear that under high endogenous uncertainty it cannot be optimal to start with more than one ‘learning venture’ at any one time.\textsuperscript{378} To diversify in several directions at once will be prohibitively costly for a corporation\textsuperscript{379} as it forfeits the experience it could have gained from the first subsidiary before starting with the next. As a result, the optimal speed of expansion and new investment will be based on the quality of opportunities, learning speed\textsuperscript{380} and the remaining endogenous uncertainty for the business group. The learning speed in turn will be a direct consequence of how the organisational set-up fosters the sharing of experience.

Portfolio investors are willing to accept more potential losses for more potential opportunities. This requires a long-term strategic perspective that multinational investors often have. Stopford and Wells (1972) were some of the first authors to note that the character of the first investments abroad is somewhat experimental. They observed that foreign investments were typically:

\begin{itemize}
  \item See Kemna, 1993.
  \item See Garud and Nayyar, 1994.
  \item See Bowman and Hurry, 1993: p.770.
  \item See Ghemawat, 1991: p.119.
  \item On a somewhat controversial note Adner and Levinthal (2004: p.74) argue that the flexibility of sequential investment created through a real options framework lies in the “possibility of abandonment of investment initiatives, rather than from the simple substitution of a stream of smaller payments for a larger lump sum payment.”
  \item This argument is consistent with the conclusions reached by Edith Penrose (1959) that it is prohibitively costly for firms to diversify in several directions at once as the management team would be overstretched.
  \item See Penrose, 1959; Casson, 1995: p.89.
  \item See Vermeulen and Barkema, 2002: p.650.
\end{itemize}
small and not critical to the success of the enterprise. They are often regarded as portfolio gambles [that] provide a form of insurance in situations where the potential penalties of not making the investment are impossible to calculate with any confidence.  

Portfolio Value

There is a broad consensus in the literature, which goes back to Miller and Modigliani (1961), that firms incorporate an option value (OV), contingent on the level of uncertainty (σ), in addition to the net present value (NPV) of cash flows. Hence, for the kth subsidiary this stand-alone subsidiary value can be described as:

\[ V_k = \text{NPV}_k + \text{OV}_k(\sigma) \]

The option value \( \text{OV}_k(\sigma) \) is composed of the call and put options on both ownership and capacity as defined above (based on the standard real options parameters). In a portfolio of subsidiaries, it is evident that \( \text{NPV}_k \) is additive, but the situation is complicated through interactions among the different intra-subsidiary options. The magnitude of the interaction between options depends on how independent the intra-subsidiary options are as well as their ‘direction’ (put or call). The ownership call option and the capacity call option can be considered somewhat independent due to the different sources of uncertainty upon which they rely. But in practice companies increasing their capacity might at the same time dilute the partner. Although ‘opposite-type options’ (call and put options with the same effect – ownership or capacity) are generally less problematic, timing differences can lead to interactions. If the ownership put option is exercised, both ownership call option and capacity call option will disappear as a consequence. If the capacity call option is exercised, the ownership call option becomes more valuable (due to a larger underlying base). The capacity and ownership options in-between different subsidiaries can typically be seen as largely independent (an exception is, of course, if several joint ventures with the same partner exist) unless access to capital is constrained.

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381 Stopford and Wells, 1972: p.20.
382 See, for example, Trigeorgis and Mason, 1987; Vassolo et al. (2004).
384 See Trigeorgis, 1996.
385 If not all shareholders contribute capital for an expansion.
386 See Trigeorgis, 1996.
When considering a group of subsidiaries, further effects will emerge. The portfolio value of the subsidiaries of more than one subsidiary is influenced by potential positive or negative effects captured in two auxiliary variables defined as ADD and SUB. With each additional subsidiary, the portfolio value hence changes non-linearly. As a result, the value of a portfolio with \( n \) subsidiaries can be formulated as:

\[
V_{\text{portfolio}}(n, \sigma) = \sum_{k=1}^{n} (\text{NPV}_k + \text{OV}_k(\sigma_k)) + \text{ADD}(n) - \text{SUB}(n)
\]

Here, \( \text{ADD}(n) \) represents the sum of all additive factors (contingent on the total number of subsidiaries) including, but not limited to, learning effects that reduce endogenous uncertainty, portfolio diversification effects that reduce exogenous uncertainty at the group level (approximating systematic risk for large \( n \)), and speed effects, where a presence is built more rapidly through the creation of subsidiaries operating in the same field.

\( \text{SUB}(n) \) represents the sum of all sub-additive factors that have a detrimental effect on the value of the portfolio. These include, but are not limited to, the duplication of assets, higher governance cost, and increasing complexity for each additional subsidiary. NPV is driven by good business decisions idiosyncratic to each subsidiary, but option value and the ADD and SUB factors imply that there is a further portfolio perspective that has to be adjusted for environmental factors. While a greater number of options imply a higher value, a large number of these platform investments can also bring the organisational complexity to a level where it becomes a management problem to exercise this flexibility and where the cost outweighs the benefit of the additional flexibility.

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387 There would, of course, be economies of scale on the positive side and potential bottlenecks and increased distribution cost on the negative side when business activities were consolidated in one subsidiary company. This is, however, of secondary importance in these considerations as cost and benefits of a single subsidiary company might cancel each other out to some degree and it is not likely that these factors would change the result. Any remaining effect is thought to be included in \( \text{ADD}(n) \) and \( \text{SUB}(n) \), with \( \text{ADD}(1) = 0 \) and \( \text{SUB}(1) = 0 \).

388 According to Portfolio Theory (Markowitz, 1959) the less correlated two assets are, the smaller the variance (seen as risk in this context) of the portfolio. The argument is applicable to the NPV portion of the argumentation but not directly to the option value as the interactions are more complex if input factors are shared (e.g. same source of uncertainty).


390 See, for example, Scott, 1998: p.96.

As portrayed in Exhibit 9, the positive value effect of ADD(n) is expected to be highest for the first subsidiary, where the portfolio diversification effect is highest, with decreasing marginal improvements decreasing variance for each additional subsidiary.\textsuperscript{392} The negative value effect of SUB(n) is more difficult to estimate, but can be expected to be more or less linearly related (on average) to the number of subsidiaries in the group (in tendency, however, a stronger negative effect for larger n would be expected). The exact shape of ADD(n) and SUB(n) is of lesser importance but the tendency (by definition) should be close to that portrayed. The option value can equally be seen in tendency as linearly and positively related to the number of subsidiaries. However, the value is not a single value but a confidence interval that reflects its contingency on endogenous uncertainty. The more the company learns, the more this range is narrowed.

\textsuperscript{392} E.g. Brealey and Myers, 2003; the benefit from the portfolio effect is falling exponentially with investments in additional (independent) assets and is highest for the first ‘diversifying’ investment.
3.5 **Framework for Research**

The financial economics literature on real options suggests that options have substantial value under conditions of high uncertainty. However, the restrictions in the application of strategic real options and their cost are largely unknown. The conceptual framework developed in the previous sections has created the basis for a focused empirical investigation. The objectives of the following research questions are to examine the principles of an options approach in foreign expansion, as well as to shed light on the contextual factors.

**3.5.1 Research Questions**

Based on the overarching research question for this thesis developed in the Introduction (*Chapter 1*)

> How should MNCs structure expansion into foreign markets under high uncertainty?

three finer grained research questions can be developed that address the three core aspects of the topic. For the analysis of this expansion process, a strategic real options perspective – as developed in the conceptual framework – will be taken. As a result, the foreign expansion is decomposed into a series of process steps that involve the development and exercising of options.

<table>
<thead>
<tr>
<th>Exhibit 10: Areas for Inquiry into Strategic Real Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clusters of Options Analysis</strong></td>
</tr>
<tr>
<td>Creation</td>
</tr>
<tr>
<td>Capacity Options</td>
</tr>
<tr>
<td>Ownership Options</td>
</tr>
<tr>
<td><strong>Option-Type</strong></td>
</tr>
</tbody>
</table>

Foreign expansion can be seen as a sequence of steps that involve different option types and contingent decisions. To analyse this process, expansion can be conceptualised as being composed of three important clusters that form a logical chain (see Exhibit 10): the creation, value and exercising of options. The inquiry will focus on the growth options embedded at the subsidiary-level that are most pronounced in the process of foreign expansion: capacity and ownership options.
A) Creation of Options

Strategic real options are intangible structures that depend heavily on the environment, in which they are nested. Some environmental characteristics will be better suited for the use of options logic, while others might restrict or corrupt its logic. The question of why some firms take an options-approach and others do not has not been satisfactorily resolved in neither the real options literature nor in the strategic and international management literature.

Research in the financial economics field on the mathematical properties of real options has mostly focused on finding numerical solutions for specific contexts and the development of improved pricing mechanisms. The mathematical view is heavily application-oriented and less context driven. Similarly, this area remains a research gap in the strategic and international management literature that has so far also overlooked the necessity to investigate the mechanisms that create or hinder options.

The examination of perceived or actual factors that limit the applicability of the options concept to subsidiaries – herein referred to as boundary conditions – might provide important insights into the factors affecting the creation of strategic real options. Little knowledge exists on the question of what type of strategic real option (growth, learn, abandon; capacity, ownership) can be found at which stage of development of an MNC subsidiary.

The following question aims at examining these boundary conditions for the creation of strategic real options. The creation of options, and its relation to exploration and innovation, is of critical importance to this process step in the wider strategic development in the country group. A better understanding of this issue could also lead to insights into how options can be managed most effectively.

Research Question 1: What factors influence the creation of strategic real options?

393 Mainly the three axioms (irreversibility, uncertainty and managerial discretion) but potentially further restraining conditions.
395 E.g. natural resource investments (Brennan and Schwartz, 1985), or manufacturing flexibility (Kulatilaka, 1984).
B) Option Value

The management literature has long struggled to capture and measure the effect of option value empirically. While some, more general aspects of real options have been empirically investigated at corporate-level (or, very rarely, at business group level), there is an emerging consensus that substantial insights into and validation of real options can only be expected from longitudinal data at plant-level. The present study examines subsidiary-level options that allow a much finer-grained analysis than that performed in previous studies, which – to a large degree – were only able to capture indirect and implicit effects of options. Nascent subsidiaries represent an ideal unit of analysis as their business organisation (defined through a legal entity) is often very simple and in many cases comprises a manufacturing facility and management.

The key question for this analysis is whether options under a high level uncertainty do indeed provide substantial value to the firm, outweighing their cost. Based on the options-logic developed above, it appears sensible to have a smaller upfront investment as long as uncertainty is high and to invest more capital later once uncertainty is substantially resolved. There is strong theoretical support, as well as anecdotal evidence, that such an approach should be valuable - but so far there is no systematic empirical evidence on the question whether such an approach is indeed a financially superior strategy for developing subsidiaries in an environment characterised by a high level of uncertainty. If such a cause-effect relationships could be corroborated by empirical evidence it would greatly support the argument for an option-based management framework as well as advance the strategic options perspective as a whole.

The preceding chapter has examined the different factors that affect the value of an options approach. A better understanding of the factors influencing the value of growth options at a subsidiary-level would have direct implications on how to best structure the expansion process under high uncertainty.

Research Question 2: How does uncertainty affect the value of strategic real options?

396 Research has focused largely on Type-1 options (McGrath et al., 2004: p.87) - see Section 2.2.2 for a description. This kind of investigation was pioneered by Kester (1984) and has its roots in the works of Miller and Modigliani (1961).

397 E.g. Folta and O’Brien, 2004; Vassolo et al., 2004.


399 E.g. through the somewhat questionable assumption that the exercise (through buyout or divestiture) of options indicates intrinsic economic value.

400 See Economist Intelligence Unit, 2001: p.3.
C) Exercise of Options

Options derive their value from the postponement of contingent decisions that are subject to considerable uncertainty. These decisions are ultimately linked to the exercising of options (i.e. in this case to abandon or to grow a subsidiary). The factors that lead to the exercise are based on managerial decision-making and are largely unknown. There are a number of studies on the optimal timing of the exercise of options, but their predictive value is very low as the complex environment that surrounds subsidiary-level options in a foreign expansion context will likely lead to substantially different results. It is therefore necessary to empirically explore these factors in order to close a potential conceptual gap between theory and practice. This leads to the last research question:

**Research Question 3:** What factors influence the exercise of strategic real options?

These three connected research questions provide a framework for the systematic inquiry into the foreign expansion process from a strategic-options perspective. The hypotheses framework follows this structure.

3.5.2 Hypotheses Framework

Based on the conceptual framework and research questions above, several hypotheses are developed that address different aspects of the option-based framework. These follow the three clusters of analysis: the creation, value and exercise of options. To account for the different mechanisms of the two effect-based option types, the hypotheses focus separately on capacity and ownership options. The separation allows a better understanding how these option types differ in their workings. It can be expected that the different sources of uncertainty will have a strong influence on the time when options are created. It is, for example, likely that companies with a higher endogenous than exogenous uncertainty are more likely to partner (i.e. create an ownership option) with local companies (in order to capitalise on the partner’s lower endogenous uncertainty).

Capacity options, from their creation to their value and exercise, are examined in a continuous chain that is portrayed in Exhibit 11. In the first part, relating to the Creation of Options (Research Question 1), the hypotheses framework proposes three main variables that influence the propensity of MNCs to choose an option character for their subsidiary (here: low initial investment size). While there are doubtlessly a number of other factors (most of them are expected to be relatively random in nature;
e.g. an individual manager’s positive or negative stance to a project), the three factors have a strong theoretical foundation in the real options theory.401

**Exhibit 11: Capacity Options – Hypotheses Model**

<table>
<thead>
<tr>
<th>Creation</th>
<th>Value</th>
<th>Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exogenous Uncertainty</td>
<td>Hyp 1a</td>
<td>Relative Investment Size</td>
</tr>
<tr>
<td>Endogenous Uncertainty</td>
<td>Hyp 1b</td>
<td>Exogenous Uncertainty</td>
</tr>
<tr>
<td>Capital Intensity</td>
<td>Hyp 1c</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

The second part, which is conceptually based on the first, the value (measured as time-lagged performance)402 of capacity options (Research Question 2) is assessed in a hypothesised relationship that involves two moderating variables (exogenous and endogenous uncertainty). Finally, the exercising of options (Research Question 3) is hypothesised to be related to three variables: the option value (high performance – exercise to profit), and the change in endogenous as well as exogenous uncertainty.

Similarly, ownership options are equally assessed along the structure provided by the three research questions (See Exhibit 12). The option character is here measured as the degree of capital ownership by the MNC (initial shareholding) of the subsidiary.403 It is further hypothesised that the level of exogenous and endogenous uncertainty determines whether options are created. In the assessment of the value of ownership options, both exogenous and endogenous uncertainty are hypothesised to moderate the effect of an ownership option stance (low initial shareholding) on the value of the option (time-lagged performance). The exercise of options (measured by whether an equity squeeze-out has taken place), the third part of the research questions, is expected to be influenced by extremely positive or negative performance as well as the change in the level of exogenous and endogenous uncertainty.

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401 Related to uncertainty (exogenous and endogenous) and irreversibility (capital intensity).
402 It can be noted here that the size of investment in combination with the return above the cost of capital is strongly related to the economic value-added concept (see Copeland, Koller and Murrin, 2000).
403 The initial shareholding appears to be the best proxy for assessing ownership options. The smaller the shareholding by an MNC, the smaller the commitment and exposure in relation to the total investment.
While the research design primarily examines growth options, both other types, the option to learn and to abandon, are captured implicitly as they are related to the growth option (be either not exercising the growth option (option to learn) or abandoning the growth option (option to abandon)).

A) Creation of Options
The factors that influence the propensity to create options in the process of foreign expansion will be examined both through inductive as well as deductive methods in the empirical part.

Creation of Capacity Options
To date, the factors that influence the creation of capacity options are still largely unknown. This leads to the implicit question why certain firms employ an options approach compared to other firms, who prefer bolder and more aggressive strategies (‘Big Bets’). This is particularly relevant in the international management context. Understanding why capacity options are created is of crucial importance for three main reasons.

First, it is unclear why some companies are more inclined to make use of an options-approach. This could prove to be very telling about the way certain industries and markets operate. Options have defining characteristics that will naturally make some industries more suitable than others. Understanding the match between these characteristics and real options could generate important insights for real options theory. Second, it allows insights into how uncertainty influences managerial decision-making in a way that makes managers become more careful. Finally, the creation of options is also often seen as an entrepreneurial act. The
question which factors have an influence on how an entrepreneurial venture is structured is therefore important to the understanding of the wider process of within-country expansion.\textsuperscript{404}

From a capacity option perspective, low relative initial investment size (RIS)\textsuperscript{405} has features that bestow a subsidiary with an option character. MNCs, it is hypothesised here, tend to intuitively structure investment on the basis of the uncertainty they encounter. While a high relative investment size can also contain options, only a subsidiary with low RIS follows an options-approach. RIS is therefore deemed to be a good measure for the creation of options (rather than normal subsidiaries).

To the best of the author’s knowledge, a relationship between the organisational as well as environmental factors and option creation has not been previously tested. Related studies, such as Campa (1994: p.575) and Folta and O’Brien (2004: p.133), have found a generally negative relationship between uncertainty and entry.\textsuperscript{406} While such a basic relationship is fairly intuitive, these studies have neglected to investigate if companies scale their investment differently under varying levels and types of uncertainty (rather than just a dichotomous approach that the dependent variable ‘entry’ in those studies represents). This might be due to the difficulty to gain access to such data and assess the option characteristics, in particular if companies have employed a relatively small initial investment.\textsuperscript{407} The focus on RIS clearly provides a more fine-grained measure that allows deeper insights into the mechanisms of strategic real options.

The RIS variable for subsidiaries is seen as an important option characteristic for certain types of companies (such as for manufacturing companies) where investment in assets is typically highly irreversible. While it is evident that there might be other factors influencing subsidiary RIS (further investigated through qualitative research in \textit{Section 5.4}), three variables (see \textit{Exhibit 12}) are hypothesised to have a particularly strong influence.

Uncertainty has two basic components in spatial markets: Exogenous uncertainty is, according to real options theory, a prime reason for staging

\textsuperscript{404} This might also have implications for the entrepreneurship literature.
\textsuperscript{405} All variables are defined in \textit{Section 4.3}.
\textsuperscript{406} Foreign exchange volatility is found to be not statistically significant for foreign entry by Campa (1994: p.575); Folta and O’Brien (2004) focused on entry into a new business field rather than a new country.
\textsuperscript{407} This characteristic applies to both capacity and ownership options. A separate analysis of initial ownership appears to be less appropriate due to the regulatory regime in the case of China that governed most early investment. If shareholding is not based on choice but rather on government policy, a quantitative analysis could not be meaningful. RIS should be a superior proxy for how much companies want to be exposed, including the ownership level.
investments. As a result, it is expected that MNCs would endow subsidiaries that are established in an environment with a high level of exogenous uncertainty with only a small investment:

**Hypothesis 1a:** A high level of exogenous uncertainty will lead to a low initial investment size for foreign subsidiaries

Similarly, although somewhat independent, higher endogenous uncertainty (primarily shaped by unfamiliarity and a lack of operating expertise within the market environment) encourages investment in learning. This equally implies a more cautious investment stance, as firms would first invest in a ‘learning venture’ before being able to assess the prospects of the exposure for large investments. Consequently, it can be expected that firms are careful while endogenous uncertainty is high:

**Hypothesis 1b:** A high level of endogenous uncertainty will lead to a low initial investment size for foreign subsidiaries

A third hypothesis positing a negative relationship between capital intensity and RIS has been added based on the preliminary qualitative inquiry, which was used to assess and re-examine the conceptual framework. Here, companies in industries characterised by low capital-intensity (e.g. consumer goods) were found to be considerably less concerned about capital expenditure and high uncertainty. This adds a further dimension to real options – relative risk. The more capital the property, plant and equipment absorbs as a percentage of the total assets, the more such a company is exposed to investment downside risk and needs to hedge its projects (e.g. through diversifying their holding, rather than making large investments). MNCs where the manufacturing activities represent the primary focus of competitive advantage are therefore expected to be more careful with investment in fixed assets and to put more emphasis on options:

**Hypothesis 1c:** High capital intensity in a business leads to smaller initial investment size for foreign subsidiaries

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408 Industry capital intensity was used as a control variable by Folta and O’Brien (2004: p.132), but only a weakly significant effect with a coefficient close to zero was found on the ‘determinants of entry’.
Creation of Ownership Options

The ownership option is the option to buy out the partner or to abandon/sell the subsidiary. Many joint venture agreements, in particular if they involve more than two parties, include call options for the equity stakes. Ultimately, minority stakes (less than 50%) might, in tendency, be seen more as an option to learn, whereas majority stakes might be seen more as an option to grow. Luo (2001b: p.72 and p.74) observed that Japanese companies, which were found to be more risk-adverse than their Western counterparts, favoured minority investments when investing in China (often in co-operation with other Japanese companies) and were reluctant to transfer technology. This could indicate that the primary focus of such constellations is more an option to learn than to grow. The relationship between uncertainty and ownership has been observed in various studies. Many researchers agree that when “firms perceive less uncertainty and become more confident of their ability to correctly estimate risks and returns” they tend to take a larger shareholding. On the contrary, this means that under a high level of uncertainty firms are more inclined to share the risk and tap local capabilities.

The level of shareholding appears to be a very sensible measure for ownership options. Consistent with earlier measures that followed in principle the same idea (e.g. Kogut (1991), who defines joint venture as a dichotomy), the initial shareholding is a more detailed level that reflects the creation of an ownership option.

The argument in the conceptual framework highlights that it is important to distinguish between a knowledge deficit that results in endogenous uncertainty and the exogenous uncertainty that is influenced by a maturing industry (e.g. less new entrants leading to a less disruptive business environment). While endogenous uncertainty might be reduced by having a knowledgeable partner, a joint venture can also add endogenous uncertainty unless both the partner and circumstances of the subsidiary are extremely well known:

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409 See, for example, Luo (2001b: p.125): Procter & Gamble had agreed to buy out Hutchinson Whampoa Ltd. in two stages, raising its interest from 69% to 80% in 1998, with an option to acquire full control until 2017 based on a prior agreed price formula; in practice those will be relatively simple provisions such as a ‘right of first refusal’, if one party is willing to sell its stake.


411 Research by Gatignon and Anderson (1988) showed that MNCs avoid investing in wholly owned firms in countries they perceive as particularly risky. In contrast, other research, e.g. Kogut and Singh (1988), found no significant relationship between experience and control. One reason could be that the measurement of experience was too unspecific and not transferable between the different investment locations/countries. Chang and Rosenzweig (2001: p.751) speculate that the inconclusiveness of existing research is because of a static, cross-sectional research design.
Hypothesis 1d: Higher endogenous uncertainty will lead to more pronounced ownership options (lower initial shareholding)

While endogenous uncertainty will be a dominant influence for the creation of ownership options, exogenous uncertainty – particularly where the partner does not provide capital investment through intangible or in-kind contributions – will also be an important factor:

Hypothesis 1e: Higher exogenous uncertainty will lead to more pronounced ownership options (lower initial shareholding)

B) Option Value

A key consideration, based on the conceptual framework developed above, is also the distinction between capacity and ownership options in the measurement of option value. Similarly, the group effects of learning and as a platform for the development of options have largely been ignored in past research. The resulting distinction between endogenous and exogenous uncertainty here appears crucial.

The choice between ‘Big Bets’ and ‘Options’ (see Section 3.4.1 for definition) as well as the implication of that choice on subsidiary value (and ultimately portfolio value) is at the centre of this inquiry. Under a high degree of uncertainty, it is argued here, the value of option-type investments is higher. The option to grow capacity and the option to learn are here the most visible. The following hypotheses will explore how uncertainty affects the value of strategic real options.

Value of Capacity Growth Options

Building on findings from the strategic-options perspective and the organisational learning stream, this thesis argues that developing new ventures in highly uncertain markets along option principles is a superior approach to corporate development in emerging markets. This approach results in lower downside risk, a broader platform to take advantage of opportunities, and the building of capabilities through learning – all critical to such an environment. In a typical case this means starting with a small initial investment, learning from experience, and expanding investment once the initial uncertainty is substantially resolved. Such incremental investment should be substantial compared with the initial investment to be considered as a growth option. This behaviour is analogous to the exercising of a series of call options, while

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412 The option to abandon, due to its complexity in measuring such companies retrospectively, is not part of the envisaged empirical investigation and is therefore excluded from the hypotheses framework.

learning from experience and capitalising on opportunities that emerge along the way.\textsuperscript{414} While this proposed process is consistent with the findings by Johanson and Vahlne (1977), who found that companies increase their commitment incrementally, in practice the structuring of this process is performed mostly intuitively rather than following a predetermined economic logic.\textsuperscript{415}

Real options theory suggests a more systematic approach. It implies that a small initial investment in a subsidiary, which represents an option stance, has value to the holding company when the uncertainty is high (Option).\textsuperscript{416} For subsidiaries with large relative investment size (RIS) under high uncertainty the anticipated market growth is already included in the initial investment (by definition of the RIS variable). As a result, these subsidiaries are burdened with higher cost, which should result in lower financial performance. Consequently, it is argued here that companies structured as Option would on average have a higher time-lagged financial performance (which is seen a proxy for subsidiary value):\textsuperscript{417}

**Hypothesis 2a:** Low relative investment size under high exogenous uncertainty will have a positive effect on the subsidiary value

**Hypothesis 2b:** Low relative investment size under high endogenous uncertainty will have a positive effect on the subsidiary value

**Value of Ownership Growth Options**

Analogous to low capital investment in capacity, firms can also keep their exposure low by co-investing in a subsidiary – with either a local or a foreign partner. From an options perspective such a structure represents a strategic real option.\textsuperscript{418} However, a previously unknown partner brings additional uncertainty into the subsidiary. The opportunity to sell the stake and salvage the investment or to buy-out the partner(s) has a value to the corporation if the terms can be agreed in advance. The numerical calculations by Chi and McGuire (1996: p.304) indicate that ownership options add to the value of a joint venture where partners foresee a potential discrepancy in valuations for a buy-out of the partner’s stake. Given the frequently different strategic rationale of such subsidiaries (e.g. entry and growth for the foreign partner, acquisition of technology and profit for the local partner) such discrepancy can be


\textsuperscript{415} It should be noted that Johanson and Vahlne (1977) started their analysis from a perspective of the behavioural theory of the firm.

\textsuperscript{416} Similar to Bowman and Hurry’s (1993) considerations on small investments and performance.

\textsuperscript{417} See Section 4.3 for definition and argumentation.

\textsuperscript{418} See, for example, Kogut, 1991.
expected to be very common in international joint ventures. Ultimately, this value should also be visible in higher performance as a result of bundling resources and capabilities (that open more opportunities) with the partner firm. Consequently, the following hypothesis can be formulated:

**Hypothesis 2c:**
Lower initial shareholding (an ownership options character) under high exogenous uncertainty will have a positive effect on subsidiary value

Endogenous uncertainty comprises many aspects that amount to a mostly reversible knowledge deficit. Partnering with a local partner should allow reducing endogenous and tapping the capabilities of the partner company. An options-approach and high endogenous uncertainty should lead to higher value:

**Hypothesis 2d:**
Lower initial shareholding (an ownership options character) under high endogenous uncertainty will have a positive effect on subsidiary value

C) **Exercise of Options**

Investments in capacity or ownership should be increased when falling uncertainty reveals NPV-positive prospects for an expansion. Such behaviour should, following the principles of real options theory, result in higher firm value.

Changing levels of uncertainty can be understood as ‘market signals’ (Kogut, 1991: p.30; Bowman and Hurry, 1993: p.769) that mark the opening of an opportunity to invest. They can arise due to a better understanding of the market (lower endogenous uncertainty) or as a consequence of a maturing market (lower exogenous uncertainty). The following hypotheses will examine the question what factors influence the exercising of the strategic real options. The right timing of exercise is important.

**Exercise of Capacity Options**

The exercising of capacity options should be a response to more certainty. Exercising too late might mean that insufficient capacity leads to a loss in market share. Exercising too early could result in overinvestment that then leads to unnecessary exposure and cost of capital employed.

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419 Luo (2001b: p.139), comparing Western and Asian MNCs in China, found a positive relationship between the length of operations of MNCs in China and their return on investment. This was particularly pronounced for Asian MNCs where the effect was about double the effect compared to Western MNCs (here, however, it was only weakly significant).

420 Theoretically a foreign-foreign combination is also possible, although relative rare.
Real options literature has long proposed (based on logic as well as idealised mathematical calculations approximating business situations) that the exercise should be a response to declining uncertainty.\textsuperscript{421} This study proposes that the exercising of options (which is defined as a substantial subsequent investment within 5 years of operations) is the result of declining uncertainty levels (endogenous or exogenous). As a result, the following hypothesis can be formulated:

**Hypothesis 3a:** Capacity options are more likely to be exercised within the first years of operations if the level of exogenous uncertainty has decreased significantly

**Hypothesis 3b:** Capacity options are more likely to be exercised within the first years of operations if the level of endogenous uncertainty has decreased significantly

If options are `in-the-money`, and therefore immediately valuable to the investor, they are likely to be exercised. For subsidiaries analogous conclusions can be reached. The higher the value of a subsidiary, the more likely capacity options will be exercised in the first years:

**Hypothesis 3c:** Capacity options are more likely to be exercised within the first years of operations if the financial performance is high

**Exercise of Ownership Options**

Ownership options carry additional endogenous uncertainty caused by the uncertainty generated by an unpredictable joint venture partner. But the exercising of ownership expansions will likely depend on the perception of exogenous uncertainty and the evaluation of the subsidiary value.

The exercising of ownership options can be measured by observing the change in ownership between the initial investment and a point in time five years later (termed equity squeeze-out of the partner).\textsuperscript{422} A financially unsuccessful joint venture is likely to be either acquired, in order to make the necessary correction with the gained control, or abandoned entirely. Kogut (1991: p.31) concluded that the likelihood of an acquisition, which can be interpreted as the exercise of a growth option, rises due to “unexpected increases in the value of the venture and the degree

\textsuperscript{421} E.g. Anderson, 2000: p.248.

\textsuperscript{422} While in general only full buy-outs can be seen as the exercise of ownership options (due to their higher degree of irreversibility), this is often limited by regulatory or governmental interference. Therefore, also partial buy-outs will be considered an exercise of ownership options.
of concentration in the industry”. Generally, companies will be likely to take action in both cases - when the subsidiary is very profitable or losing money. This will be done either by buying out the partner (for profit or to turn around) or by abandoning an option through a sale:

**Hypothesis 3d:** Ownership options are more likely to be exercised if the financial performance of the subsidiary is very high or very low

The exercising of ownership options has been found to be related to market signals. The concentration of an industry would in general also result in a declining exogenous uncertainty, which leads to the following hypothesis:

**Hypothesis 3e:** Ownership options are more likely to be exercised the more exogenous uncertainty has fallen

The international management literature has commonly portrayed joint ventures as a way to utilise the knowledge of local companies. This would, in theory, allow foreign entrants to familiarise themselves with the environment while endogenous uncertainty is high. Where partners do not share the same vision for the future of the joint venture this leads to separation – likely at the point where the foreign partner (the more resourceful) perceives to have learned enough:

**Hypothesis 3f:** Ownership options are more likely to be exercised the more endogenous uncertainty has fallen

**Summary**

The hypotheses are derived from findings of the strategic options perspective as well as strategic and international management research, but – to the author’s knowledge – none have so far been substantiated by empirical research. The hypotheses, if supported, would suggest that a controlled entry, with small initial investment and subsequent exercise of incremental growth options, would be the preferable strategy for MNCs to enter new spatial markets.

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424 Except the relationship with capital intensity, which come as a result of the preliminary interviews.
3.5.3 General Propositions

The following arguments are closely aligned with the ideas of contingency theory, that the best way to organise “depends on the nature of the environment to which the organization relates.” They also reflect the belief that environments that are characterised by a high degree of uncertainty and rapid rates of change require structural responses.

The basic idea introduced here is that a larger group of carefully set-up subsidiaries (strategic options to the MNC country management) would provide more chances of success and raise the expected group value. As the cost per option is theoretically limited to the initial capital investment (an assumption that has to be carefully reviewed for each option) this practice reduces the overall risk of the portfolio. The incremental positive effect of risk reduction could, however, be diminished with additional subsidiaries as the increased complexity arising from monitoring a larger number of strategic options creates rising cost.

Creating more options typically also means raising overall variance due to increased exposure to additional sources of uncertainty. More variance encourages more exploratory learning, which in turn should result in more novel knowledge and more capabilities to improve adaptation in highly dynamic environments. When taking into account the increased level of complexity, the situation appears to suggest that MNCs should create a well-balanced portfolio of subsidiaries, with an emphasis on creating new options, at subsidiary level or at the operational level. It is clearly very important to focus on the most valuable options and avoid excessive complexity.

Applying the options idea to subsidiary management would have two main implications for the structure: on a subsidiary level, the corporate development process would be more experimental in nature, contingent on uncertainty, and would involve only relatively small initial investments. The initial investment size of these experiments should be enough to see if the subsidiary has potential to be of great value (i.e. above the economies of scale threshold level where it becomes commercially viable). On a group level, the option principles would mean that an MNC would manage a larger number as well as the right balance of subsidiaries:

425 See Burns and Stalker, 1961; Lawrence and Lorsch, 1967.
427 See Kemna, 1993.
428 See McGrath, 2001: p.119.
429 This is related to the venture capital idea also raised by Hurry, Miller and Bowman (1992: p.89).
exploiting some larger subsidiaries (mature cash cows) and exploring through a larger number of experimental subsidiaries.

Based on the theoretical considerations of Section 3.4.2, the positive effect of ADD(n)\(^ {430}\) can be assumed to rise disproportionately with small \(n\) due to the portfolio effect (assuming independence between investments)\(^ {431}\) that would then level off for larger \(n\). The option value OV(\(n, \sigma\)) rises linearly (equally assuming independence), although with a widening confidence interval (and variance). The negative effect of SUB(\(n\)), mainly driven by rising complexity, is assumed to be a linear function of \(n\) (See Exhibit 9).

It is evident, that with an extreme number of subsidiaries (e.g. 200) the negative effects would certainly outweigh the positive effects (incl. options) of additional subsidiaries.\(^ {432}\) Consequently, the combined curve of \(E[V_{portfolio}(n, \sigma)]\)^{433} would cross the zero axis at a point \(\bar{n}\) with \(\text{SUB}(\bar{n}) = \text{ADD}(\bar{n}) + E[\text{OV}(\sigma, \bar{n})].\)^{434}

\(^{430}\) See Section 3.4.2 for definitions of ADD, SUB and OV.

\(^{431}\) This assumptions appears reasonable for many large firms that operate through largely independent strategic business units. These have discretion on separate resources bundles (capital, technology, skilled employees) that are used to create subsidiaries.

\(^{432}\) Such argumentation is corroborated by evidence cited by McGrath et al. (2004: p.97) that found that firms with portfolios where many options had been successfully created were less likely to create new ones.

\(^{433}\) Expected value of the subsidiary portfolio, which is a function of the subsidiary group size \(n\) and the level of uncertainty \(\sigma\).

\(^{434}\) Numerically, \(n^*\) could be a continuous variable, so \(n^*\) has to be seen as an approximation.
Mathematically, having the slope cross the zero axis at two separate points (with positive values in between) means that a maximum \( V^* = \max(E[V_{portfolio}(n, \sigma)]) \) must exist. As a result, the slope of the combined effect curve of the portfolio value \( V_{portfolio}(n, \sigma) \) approximately follows bell-shaped curve (see Exhibit 13).

In order to maximise the value of the subsidiary portfolio, it is important to consider that the structural value is, ceteris paribus, contingent on two main factors: subsidiary group size \( n \) and uncertainty (measured by the combined volatility \( \sigma \) of endogenous and exogenous factors). This leads to the following propositions:

**Proposition 1:** The optimal subsidiary group size \( n^*(t) \) that maximises the value of the subsidiary portfolio at a given time \( t \) is contingent on exogenous and endogenous uncertainty.

As endogenous uncertainty can only be reduced through learning and exogenous uncertainty will – as a central tendency – equally reverse in a maturing industry, the combined uncertainty bound to change as a result of time and experience. Consequently, the optimal portfolio size of subsidiaries \( n^* \) changes over time and companies would tend to adjust the number of subsidiaries to environmental uncertainty. This should lead companies to develop more subsidiaries in the early stage of market development when exogenous and endogenous uncertainty is high, and to reduce subsidiary group size once uncertainty has been largely resolved:

**Proposition 2:** The development of the optimal number of subsidiaries will follow a skewed bell-shaped curve over time if the company entered at a very early stage of high exogenous and endogenous uncertainty.
4 Research Design

4.1 Research Methodology

4.1.1 Principal Considerations for the Research Methodology

Academic research in management and social sciences is often categorised into two principal methodological approaches:

A) **Quantitative research**, which is aimed at isolating common patterns or processes that can be used to characterise a population and to identify cause-and-effect relationships, by the means of statistical analyses of experimental, survey and archival data sources.

B) **Qualitative research**, which emphasises the understanding and interpretation of social phenomena in real-life situations, is concerned with the analysis of processes and meanings, which are not measured in terms of quantifiable measures.

Ultimately, many research designs will comprise both quantitative and qualitative elements and so will the following research design will make an attempt to present a balanced approach by employing both. To maximise the contribution to the field, Snow and Thomas conclude, the field research method should have a “balanced research agenda, multifaceted research approaches, innovative data gathering techniques, and an applied futuristic orientation” (1994: p.457).

There are a number of different research designs that could shed light on the answer to the research questions posed. However, as Scandura and Williams (2000: p.1250) note, there is always a practical compromise for each research design with regard to the “three dimensions”: generalisability of results, precision of variables and realism of context. Triangulation, the use of several complementary methodologies (such as interviews, survey and observation) to view the same phenomenon, many researchers agree, is an effective way to increase the quality of the scientific work from a technical point of view and overcome the weaknesses if research methods are used in isolation.

Clearly the research design has also implications for the amount of additional work that is required if multiple methods are to be employed. Furthermore, most

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439 See Miles and Huberman, 1994: p.41.
research is constrained by time and the availability of financial resources. The best solution is therefore to critically examine different research methods, assess their potential contribution to the study and ultimately select a small number of complementary methods. This should be done in light of what methods provide the best fit, and if these can realistically be employed given the restraints in execution. These considerations to find the optimal research design for the research questions under review are discussed in Section 4.2 for a number of different research methods.441

4.1.2 Study Setting

Profile of the Empirical Study
The empirical study was designed to comprise both qualitative and quantitative elements to ensure a rigorous design that emphasises the idea of triangulation of findings. The qualitative inquiry aimed at uncovering patterns and understanding the background through interviews with senior managers at MNCs operating in China. The interviews were conducted with the specific objective to explore the context as well as to identify cause-effect relationships that are often difficult to quantify (e.g. governance structure). The quantitative research focused on subsidiary-specific survey elements, which were asked for during the interviews that were checked against independently acquired archival data. These measures allow the statistical testing of core elements of the conceptual framework.

The combination of both quantitative and qualitative research enables a comprehensive analysis of the merits of an option-based investment approach from different angles (resulting in triangulation). The qualitative part questioned whether managers found such an approach appropriate for their company and industry. The quantitative part attempts to confirm or contradict the manager’s beliefs as well as to test theoretically developed hypotheses. The following section will discuss the research design in more detail.442

441 According to Sekaran (2003: pp.117-118), a research design should include details about where the study will be conducted (study setting), the type of study (type of investigation, e.g. establishing causal relationships), the duration of the study, the extent of researcher interference, and the level at which data will be analysed (unit of analysis), type of sample (sampling design), data collection methods, variable measurement (operationalisation), and how data will be analysed to test hypotheses. The elements of this list will be discussed below, albeit in a changed and more natural order.

442 The evaluation of potential research methods broadly follows the research method categories as classified by Scandura and Williams, 2000: 1249-52.
4.2 Overview of Research Process

The research design has two purposes: theory building and theory testing. Theory building is primarily performed by investigating patterns of foreign expansion and setting these in relation to the options-based management approach. Theory testing is primarily done through statistical analysis as well as through the examination of option patterns in a multiple-case study setting.

The research process encompassed four main components: (1) literature review and theory building, (2) selection of population and sampling, (3) empirical field research, and (4) data analysis.

4.2.1 Literature Review and Theory Building

Although the areas of real options theory and the international management literature have many common themes – the theory has so far not been integrated conceptually. Real options theory, the theoretical foundation for a substantial part of the research situation presented above, is – due to its origins in financial economics – an area dominated by formal logic and mathematical solutions. The conceptual framework presented in this dissertation combines knowledge from real options theory, and strategic and international management research.

An important aspect is that the synthesis of the different theory streams fit well together: the idea of flexibility through real options can be seen as a natural response to the typically high uncertainty encountered when entering a new market; learning in such environments addresses such uncertainty (which directly relates to real options); subsidiary role, portfolio theory, and the governance mechanisms employed to expand within a country each complement and enforce the combined conceptual framework from different angles. Part of the research therefore seeks to further extend the theory through reasoning and the connection of theories.

However, this process relies heavily on ‘real life’ considerations that will be examined in the fieldwork – in particular the boundary conditions that limit the use of such an approach. As Scandura and Williams (2000: p.1250) note, formal theory can provide a high level of generalisability but is weak on precision of measurement and realism of context. The empirical testing of the conceptual framework developed in this dissertation is therefore one of the key objectives for the field study.
4.2.2 Population and Sampling

Fit between Purpose and Setting
The main purpose of this dissertation is to provide a better understanding of strategic options as well as the expansion process under high uncertainty. To assess strategic options it is important to select a market that exhibits both a high degree of uncertainty as well as sufficient size to observe participants. Both characteristics combined provide the variance needed for scientific inquiry.

The People’s Republic of China has been selected as it is widely considered one of the most difficult markets for MNCs – a result mostly of high growth rates, hyper-competition in many industries, and a high degree of uncertainty. China is not only the biggest emerging market, it also represents an interesting showcase with implications for other emerging markets.

The country represents an almost ideal case as it officially only re-opened for foreign investment in 1978, providing – more or less – equal starting situations for all interested MNCs as well as a compact period for research. Due to the limited but intense period of about a quarter century – the latter half dramatically more active in terms of foreign direct investment than the first – the history of most firms is still relatively fresh and accessible.

A) Definition of the Population
The research project aims to generate new insights about investment and governance mechanisms of large manufacturing MNCs entering highly uncertain markets. The definition of the population follows the parameters derived from theoretical considerations of the three necessary conditions for real options. Manufacturing companies were selected due to the typically irreversible nature of their subsidiary investments, which is an important component for real options reasoning. The prevalence of a high level of both exogenous and endogenous uncertainty (compared to developed markets) led to China as the setting for the study. And, finally the necessary managerial discretion for options is expected to be most pronounced in MNCs with sufficient financial, managerial and technological resources for within-country expansion.

As a result, the MNCs in the population are firms have for the most part sufficient resources to choose when, where and how much to invest. In addition,

443 Excluding the Special Administrative Regions of Hong Kong and Macao.
444 Following the announcement of the ‘Open Door Policy’ by Deng Xiao Ping, the former Chairman of the Communist Party of China and President of the People’s Republic of China.
large MNCs are more likely to have more subsidiaries, and can therefore provide better information regarding the use of strategic options due to their larger experience and the expected group effects.

The population excludes high capital-intensive industries because of their often distinctly different business characteristics, as they typically require substantial investments for single plants, without intermediate scaling steps. The logic of large-scale investments can be completely different from the outset, as focus in these industries is often a decisive strategic posture.

The tight definition of a population and focus on a specific group of manufacturing companies also limits the variance within the sample to make comparisons across the cases more meaningful.

B) Sampling Methodology

The research objective was to investigate firms with a substantial China presence, typically involving a sizable subsidiary group. The following sampling methodology was adopted. The basis for the sampled population was the list of the 500 largest companies in the world as featured in the 'Fortune Global 500' ranking. This list was subsequently amended for firms appearing in the Toyokeizai Data Bank 2000, a directory of Japanese subsidiaries, which have a significant presence in China as well as further smaller (non-Chinese) MNCs (with minimum sales of USD 2 billion in 2003) from other mostly non-Asian countries. The scope of the sample was further narrowed down by excluding companies that are either not manufacturing companies or fall in the high capital-intensive category. The sampled population then included 114 MNCs. Of these 40 percent (46 companies) have their global headquarters in Europe, 40 percent in North America (46 companies) and the remaining 20 percent in Asia (22 companies).

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445 High capital intensive industries were excluded as these often exhibit markedly different operating and investment characteristics (e.g. certain minimum scale which is often above USD 500 billion for single factories). Such industries, for example, aerospace firms, base chemicals (firms that were also active in specialty chemicals were included in the sample), semiconductors, and automotive OEMs.

446 See Yin, 1984; Parkhe, 1993.

447 Significant in this context was defined as 10 subsidiaries or more.

448 Excluded were all kinds of service companies, and companies in the following industries: energy (incl. oil, gas and utilities), retailing, natural resources, trading, financial services, consulting, logistics (incl. mail and freight delivery, railroad, airlines), wholesalers, agricultural processing (incl. tobacco firms), food services, health care services, waste management, media, publishing and entertainment firms, construction firms, tourism, software and telecommunications services.

449 Figures rounded to add up to 100%; Japan and the USA make up most of their geographies.
The sampling technique used for this study and described above can be classified as ‘purposive sampling’. As Black (1999) notes, such an approach can be criticised as a potentially endogenous choice by the researcher as it can be “difficult to justify the representativeness of the resulting sample” (p.124). The high number of MNCs that are part of this study and the strict definition of the sample will, however, mitigate this potential problem (see Appendix A for a listing of companies of the sampled population).

However, beyond this core group of companies and in order to ensure that the perspective of high capital-intensive manufacturing companies is also understood, a number of ‘out-of-scope’ interviews were conducted, without collecting quantitative data on those companies. The companies that make up the sample were systematically derived and contacted electronically with a request for a meeting and a document explaining the background of the research. If no response to an email or fax was received after three requests for a meeting, this was interpreted as a rejection. For some MNCs, even after substantial effort, no address or email contact could be identified. The final sample included 33 MNCs, about half of those (16 MNCs) provided the detailed data required for the quantitative analysis.

C) Generalisability of Sample

The research results derived from the analysis of MNC subsidiaries in China might not be fully transferable and generalisable to other companies in other countries and situations. It might, however, add additional insight and be at least partly prescriptive for other environments with similar characteristics. The context of China as a focus of this study is seen as at least somewhat representative of the emerging market spectrum. Through its enormous size and regionally (and sometimes even locally) different economic and legislative conditions (e.g. special economic zones) the country reflects many different investment situations. Naturally, MNCs prefer to invest in the most attractive of those sub-markets. However, as this study focuses on a few core parameters that reflect a generic situation (such as the level of uncertainty), the principles of option-based management – as posited in this dissertation – do have some degree of theoretical generalisability across environments of high uncertainty. Industry rather than country-specific factors are most likely to be the core parameters.

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451 Details of the sample for the qualitative and quantitative inquiry are laid out in the descriptive statistics presented in Chapters 5 and 6, respectively.
452 These include industry regulation that lead to different rules of MNCs, even on a industry sector level.
4.2.3 Empirical Field Research

Data Collection Methods
The field study spectrum typically applied by researchers includes participant observation, interviews, questionnaire surveys, and archival data analysis.\(^{453}\) The complexity of the issues involved require a dialogue between the researcher and the interviewee where explanations can be given and potential misconceptions can be re-examined immediately. This makes a remotely administered questionnaire survey technique rather unsuitable, in particular as the topic is not a common managerial issue and needs a considerable amount of explanation. By contrast, interviews can be a powerful method to extract this knowledge and substantiate theory where findings stem from a large number of representatively sampled interviews.

The two primary sources of data collected were (1) semi-structured interviews with key executives of MNCs in China, and (2) data form for each of the subsidiaries of the MNC. Additional desk-research on publicly available information (e.g. news reports from the Factiva database as well as internet sources) was used to triangulate information received through the interviews.

The methods employed include (A) pilot interviews in the preparatory phase, (B) sampled interviews, and (C) survey/ archival data collection.

A) Pilot Interviews
Pilot interviews were used to refine concepts, constructs, variables and operational definitions. The interviews with four interview partners, former senior managers of MNC country management or subsidiaries in China, were primarily used to assess the clarity and relevance of questions in the interview instrument, as well as to validate the research questions as relevant areas for research (from a practitioners perspective) and assess the feasibility of the overall undertaking.

Most of the pilot interviews (75\%) were conducted by telephone, as the interviewees are highly mobile managers with busy schedules that allowed no face-to-face meeting. Here, initial construct assumptions were refined and the findings out of the interviews were used to calibrate the research instruments. The interview design is semi-structured with open-ended and intermediate questions.\(^{454}\) Despite some commonly observed disadvantages of telephone interviews compared to in-person interviews such as greater likelihood of self-generated answers and a lower


effectiveness with complex issues, the telephone interview is valid and resourceful method – suitable to meet the requirements for this stage of inquiry. The pilot interviewees were selected based on theoretical sampling – this kind of sample is suitable as a basis for theory building although it does not represent a population.

B) Sampled Interviews

Focus of Inquiry

The interviews were inductive in nature and focused on four broad areas:

1) Historic evolution of the company in China (incl. expansion strategy, chronology of entries, rationale for key decisions, initiative for investment)
2) Investment policy (incl. signals to invest, postpone investment, motivation for localisation of manufacturing plants, coordination across subsidiaries, risk averseness, abandonment of subsidiaries)
3) Environmental conditions (incl. sources of uncertainty, factors that could curtail the flexibility to use an options-structure)
4) Structural responses (incl. subsidiary autonomy, reporting lines, option characteristics, ‘extreme staging’ – only the minimum investment at the threshold level of economies of scale, organisational learning)

Targeted Individuals for Interviews

The interviews with senior executives overseeing the Asia/Pacific and China region served to develop a thorough understanding of issues pertaining to the conceptual framework. The targeted interviewees included primarily Presidents for the China or Asian operations, Chief Financial Officers for the China or Asian operations, and Directors of Strategy and Corporate Development for Asia and China.

455 See Shuy, 2002: pp.539-545.
456 Ultimately, this also represents to some degree a form of convenience sampling as only some of the companies in the sampled population has be approached for an interview. The main reason for this was that the initial assessment of the likelihood of interviews being granted on a ‘cold call’ basis was extremely low for companies with their global headquarters outside of Germany and Switzerland. This, however, appears appropriate for this early stage of inquiry as there is no risk of sample bias.
457 The title for this position varied widely from ‘Chairman of the Board’, ‘Chief Executive Officer’, ‘President’, ‘General Manager’, ‘Country Manager’. Scope varied from ‘Mainland China’ (excl. Hong Kong) to ‘Greater China Region’ (incl. Hong Kong and Taiwan) and ‘Asia Pacific’. 
Interview Procedure

The companies of the interviews have been systematically contacted based on the population as defined in Section 4.2.2. The main round of interviews consisted of well-prepared and semi-structured interviews. These in-person interviews (except for a few exceptions with telephone interviews) have an explorative and confirmative character with intermediate and open-ended questions.

Interviews followed a carefully prepared protocol using both specific questions (e.g. “Has your company ever abandoned subsidiaries in China?”) and open-ended questions (“How did your subsidiary group evolve over time?”). The interviews were conducted between October 2003 and November 2004 and typically lasted one hour. The interviews were conducted in either English or German.

To ensure a more open discussion the interviews were not taped. Instead, notes were taken and the interview transcript sent on the same day to the interviewee for review to correct misunderstandings and the explicit right to censor potentially commercially sensitive information. About more than half of the interviewees (62%) returned an edited transcript, for the rest the correctness of the transcript was assumed. A total of approximately 140 pages of interview transcripts in dense form were assembled through this process.

The interviews had a survey interviewing/archival data component, a standard positivist methodology, in order to capture the key parameters for each subsidiary that describe its development over time. The interviews had a small but very important interpretative component, where the perceptions of events that have led to investment decisions were discussed. While interpretation by nature is endogenous and therefore prone to a certain response bias, it is also a valuable element to put events into relation with each other. Due to the focus on facts and events in the expansion chronology as well as objective organisational characteristics, rather than subjective items that are directly related to the interviewees, the process used for the data collection is deemed to be less subject to potential cognitive biases and impression management.

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458 This included a detailed analysis of the company’s history in China based on publicly available information, a good understanding of the companies businesses and product lines and historic corporate events (e.g. mergers and acquisitions), as well as other information relevant to the interview. This provided a basis for an informed discussion of each company’s expansion strategy in China and quickly led to critical points.

459 In one case an interpreter (the deputy manager) was used where the interviewee preferred to answer in his native language (Japanese), which was then translated into English. All questions were asked in English, which the interviewee understood well.

460 See Rubin and Rubin, 1995:pp.31-35.

461 See Huber and Power, 1985; Miller et al., 1997.
C) Survey and Archival Data

The unit of analysis for the survey/archival data are single subsidiaries established by a surveyed MNC in China. The combined survey/archival data component was designed to yield quantitative parameters that characterise the development of subsidiaries over time and allow for statistical analysis using regression models. For each subsidiary these included (1) subsidiary name, (2) industry segment, (3) first operating year, (4) a judgement call by the executive regarding the relative investment size (using peers and internal (international) comparison as yardstick), (5) subsequent substantial investment size (percent, in relation to initial investment size), (6) year of subsequent investment, (7) a judgement call by the executive regarding the relative performance compared to the cost of capital after 5 to 7 years after establishment of the subsidiary, (8) initial shareholding, (9) shareholding after 5 years, (10) first (foreign) entrant in its field (yes/no), (11) sales destination (percentages for China, intra-group, third-party overseas sales), (12) number of employees after 5 years, (13) reason for subsequent investment and comments. The data sheet was typically returned later by fax or email. The executives were requested to use their knowledge of the past performance and investment levels (based on archival data) to assess the relative levels. Problems for such judgement calls could include unavailable archival data (e.g. on investment size in the early 1980s) and potentially rationalising the past.

The data, although historic, were in many cases considered commercially sensitive by the MNCs. A number of interviewers who agreed to be interviewed declined the provision of the detailed data on this basis. A number of other companies, although inclined to provide the required data, were not able to procure those due to insufficient records of past activities in China.

The data was collected at the Asia/Pacific or China headquarters level. While theoretically the other route, via the subsidiaries themselves, would also have been theoretically feasible it was decided that approaching the headquarters directly for this information had a strong advantages. The headquarters, in comparison to single subsidiaries, usually has a longer memory (through its staff) as well as (at least in some cases) a good archive containing the required information. Furthermore, the country headquarters is in a better position to make comparisons among

462 Such procedure has precedents, for example, in Prahalad and Doz (1987), Jarillo and Martinez (1990), and Taggart (1998).
464 In some of the cases, such knowledge was reportedly entirely lost by MNCs in the contacted, where key managers had left the organisation.
subsidiaries. Weighting the advantages with disadvantages of such an approach, consistency as well as other arguments point to the headquarters-level as a superior point for data gathering.

4.2.4 Data Analysis

A) Methodology for the Qualitative Approach

This thesis endeavours to uncover cause-effect relationships by studying the expansion of a number of MNCs in China and analysing these cases using a strategic-options perspective. However, the context and dynamics of corporate development are naturally highly complex, making it difficult to uncover the all mechanisms. The analysis is based on chronologies of MNCs’ expansion into China that partly resemble classical studies by Chandler (1962) and Lawrence and Lorsch (1967). The underlying sociologically aspects, a prevalent theme in contemporary management research more commonly found in published case studies of the last two decades, have not been part of the inquiry presented in this dissertation.

Multiple Case Study Design

There is a general consensus in management research that the use of multiple case studies is a very illuminating as well as scientifically sound method to build new theory. The case studies were designed to portray the historic development (in the case of China limited to the period since 1978) and to examine the key milestones in the process of expansion. Superior theoretical insights from case studies, as Eisenhardt (1991: p.626) concludes, “derive from methodological rigour and multiple-case comparative logic.”

465 A disadvantage of collection of on the subsidiary-level would have been the typically short assignment period of expatriate managers, which could lead to that a substantial portion of the required information might not have been stored or transferred to the successor. A third or fourth generation manager would have difficulty to make judgment calls (e.g. the relative initial investment size) and procure the numbers necessary. In addition, he would not necessarily have the oversight to compare this to other subsidiaries within the subsidiary group. Another disadvantage of an approach on the subsidiary level would be the completeness of subsidiary group information. A practical issue would be that with a distribution over a large country for some groups arranging meetings with all their subsidiary general managers in distant locations (not seldom far away from the largest cities) would take a very long time and would make it difficult – if not impossible - to follow the group movements in their entirety. So approaching the Asia/Pacific and China headquarters was also a result of the feasibility considerations.

466 E.g. Yin, 1984; and Eisenhardt, 1989b.

467 However, building such case studies is often difficult due to the limited number of information sources available. Inevitably, most of the expansion process is only partially visible from the outside, and only key events are reported in the news. On the inside, few people within a MNC’s Asia or China organisation have the experience and oversight to provide a detailed account of the case.
Coding Process
The study follows the process detailed by Strauss (1987) comprising three phases of data abstraction: open coding, axial coding, and selective coding. The open coding was performed intensively particularly during the first half of the interviews. Recurring themes and issues for the expansion policy were identified (e.g. common approaches, mistakes and best practice) at the companies that participated in the survey. This kind of coding has low abstraction level based on the interview transcript and served as a first attempt to condense the data into categories. The interview instrument (a core set of questions), which was designed to address various aspects of the research question, provided a clear structure and comparability on the areas discussed. Key statements by the interviewees were highlighted and patterns across cases began to emerge.

The second pass through the data was focussed on axial coding. This process, which took place when most of the interviews were completed, was focused on cause-effect relationships as well as interesting findings discovered during the open coding. This process involved two principal ways of data organisation: cross-sectional as well as longitudinal organisation. The cross-sectional analysis helped to further highlight and scrutinise the results of the open coding categories, the interview notes were organised in tables and sub-tables (e.g. for industry-specific comparisons). Linkages between themes and concepts were established. Some less promising themes were dropped while some new themes emerged, highlighted by organising the data differently. The longitudinal analysis allowed a more in-depth analysis of the development of companies by drawing from multiple sources. This data was then transformed into chronological documentations for MNC expansion strategies.

Finally, the selective coding process uses this prior data abstraction by comparing the longitudinal cases as well as the cross-sectional analysis. By drawing on the principles of analytic comparison commonalities among the longitudinal case studies were exposed (method of agreement) and differing features further examined (method of difference). This led to the identification of high-level sequences that integrate the conceptual elements developed and examined so far. The findings were then contrasted with the hypotheses, the conceptual framework, and existing theory. A number of other literature streams (that have not been the focus of this study) were compared with the findings of the present study in order to expose potential
conflicts. Finally, the “cases that illustrate a theme”\(^{470}\) were selected in a way where the most interesting cases (in three industries) were contrasted based on a discussion of industry characteristics that might be relevant for an options-approach and set in relation to the conceptual framework.

**Triangulation**

The triangulation of interview accounts is possible to some degree, particularly where the new reports or internet sources have featured development within the firm or its actions. Interviews and external information sources combined can be seen as a sufficient basis to build a reasonably accurate picture of the case. This procedure facilitates some form of cross-checking of responses received by individuals in MNCs where more than one person was interviewed or alternate sources of information exist.\(^{471}\) Conflicting information that was critical for the analysis was clarified with the interviewee.

**B) Methodology for the Quantitative Approach**

It is very clear from the beginning that a complex issue such as options-based management cannot be easily tested with statistical methods. Empirical investigations of real options have so far been scarce and limited to peripheral implications of the theory (rather than addressing the core value hypothesis).\(^ {472}\) The few prior attempts in the literature to empirically investigate real options in management have either used very crude approximations (e.g. corporate/business group level investigations) or neglected crucial elements of the real option structure (e.g. the impact of uncertainty).\(^ {473}\) In particular, the finding of a suitable proxy for uncertainty has never been satisfactorily resolved. A difficulty for the present investigation is that there are no precedent research studies on the topic where constructs and operationalisations could be used, as prior studies (with very few exceptions, such as Kogut, 1991) have restricted themselves to available information instead of collecting appropriate measures in the field.\(^ {474}\)

While it is evident that by looking at a smaller unit of analysis – e.g. subsidiaries compared to the standard corporate-level view – such analysis must

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\(^{471}\) See Schütte, 1996: p.69.

\(^{472}\) See Exhibit 5 in Section 2.2.2.

\(^{473}\) This is mostly due to the common reliance on existing databases (such as Compustat) and the practice of tailoring models based on the few data points available that might be (often vaguely) related to the few data points available that still support a real options idea.

\(^{474}\) Prior studies have relied on available information instead of collecting appropriate measures empirically.
become drastically more insightful, it is also clear that the availability of data and its consistency will be a critical point for any analysis performed in this context.

One challenge for the operationalisation of the variables is the scarcity of empirical research on strategic real options. As a result, some of the key operationalisations have never been used before (at least not in a similar context), which means that the measures have to be created from scratch and therefore have not been validated before by previous studies. The approach taken in this study is to combine empirically gathered data with external data (such as industry volatility, a proxy for exogenous uncertainty). This has clear disadvantages due to the disconnect between the company and the data source.

The theoretical case for the correctness of the commercial logic of an options approach is very strong and supported through the mathematical models of option values in the financial economics literature. But while it is doubtful that empirical methods will ever provide a strong support on the basis of an inevitably imperfect data set (in particular measuring uncertainty), a statistical analysis should be able to at least provide an indication as well as other insights that could shed light on this mystical option construct.

Potential Areas for Bias

There are several potential areas for bias that have been considered in the analysis. First, there is likely a response bias – this will be discussed in detail in the description of the sample in Section 6.1.2.

Second, there could be a survival bias. Although unlikely for the MNCs that provided data, it cannot be entirely ruled out (although this was information specifically requested) that subsidiaries have been shutdown prior to their seventh year and not reported by the interviewed company (due to various reasons). The option period – while deemed reasonable – could be too short to monitor long-term effects of an option-based approach. The effect of mergers (of the global parent company) and acquisitions cannot always be clearly identified for subsidiaries (e.g. single or a number of subsidiaries merged into the group through a global acquisition) and thus could lead to miscalculations of experience effects (which would then result in a wrong endogenous uncertainty measure) for subsidiaries. All of these factors might adversely influence the quality of statistical inferences.

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475 See Adner and Levinthal, 2004: p.83; Carruth et al., p.149.
476 See, for example, Miller and Folta, 2002: p.665.
Common method variance bias\textsuperscript{477} is, of course, possible in any case where judgement calls are made on a senior level. Performance measurement is particularly prone to potential bias through the scale format and scale anchor used (done on a 5-point Likert scale)\textsuperscript{478} or a potential general tendency to portray results more positively than they are in reality. There are, however, a number of arguments why the used method can still be considered as comparatively robust. First, the judgement call by the respondents was in most cases based on archival data. This allows a better, less biased assessment of the data under review. Second, there was no incentive for respondents to alter the data, as they were aware that this data would only be used as part of a larger sample and that their company would not be named. Third, as the performance was requested in relation to the cost of capital, such assessment has a strong, industry-specific anchor point. Finally, concerning feasible alternatives: there are few reasons to believe that the judgement of more people (almost inevitably junior in position with less experience and oversight, as all data was provided by (or on behalf of) the country CEO or CFO) would necessarily improve the measurement. Similarly, most other managers would not have the necessary oversight to compare across regions and countries to make an assessment of relative investment size (RIS).

4.2.5 Overall Assessment of Research Design

Formal theory in combination with a field study involving interviews and survey/secondary data appears to be the most promising research set-up for this set of research questions. According to the Scandura and Williams (2000) classification, the field study (consisting of interviews) provides a strong realism of context while the archival data based on accounting data can be judged to be moderately high in precision of measurement.\textsuperscript{479} Survey designs, while high on generalisability, are generally considered weak in realism of context and accuracy of measurement. But the specific type of archival data requested in the survey can be expected to provide higher accuracy than is generally associated with surveys. The weakness of this combination of research methods is therefore somewhat in the area of accuracy of measurement for some of the measures. However, as the design carries both qualitative and quantitative characteristics with partly overlapping foci of inquiry, the research design achieves a substantial degree of triangulation – increasing

\textsuperscript{477} See Podsakoff \textit{et al.}, 2003: p.879.
\textsuperscript{478} See Podsakoff \textit{et al.}, 2003: p.884.
\textsuperscript{479} See Scandura and Williams, 2000: p.1251.
research validity.\textsuperscript{480} While triangulation of data is not as critical for investigations of organisational matters as it is for social science research,\textsuperscript{481} the design of the study nevertheless emphasises different sources of data in order to gain overlapping (for cross-checking purposes) as well as complementary insights. These sources comprise qualitative data through interviews, quantitative data though the survey/archival data instrument, and third party publicly-available information on the expansion processes under investigation.

**Validity of the Components of the Study**

To ensure a high quality for the research result, the constructs were frequently re-evaluated during the research project. The interviews were used to ensure “that no other variables than the ones of interest can differentially affect the studied outcome, thus enhancing internal validity.”\textsuperscript{482} The fact that the research sample will comprise a wide range of companies will enhance external validity.

There are many aspects that could be considered worthwhile to control or to measure alternatively. One of the standard control variables is the industry a company is operating in. The subsidiary data collected is very detailed in its nature, characterising the business by their activity not only the main industry classification of the parent company. The measurement of the detailed characteristics of the subsidiary is, however, in fact endless as each business is bound to have different mechanisms and reacts to different sources of uncertainty.\textsuperscript{483} As a result a certain simplification is necessary to a level that represents a good balance between too much detail (which makes comparison impossible) and a too coarse grained approach that over-simplifies.

\textsuperscript{480} See Scandura and Williams, 2000: p.1252.

\textsuperscript{481} This is due to the fact that organisational matters (e.g. reporting lines, stabling subsidiaries, …) are less subject to interpretation, and as a result more objective.

\textsuperscript{482} See Black, 1999: p.57.

\textsuperscript{483} For example, even within an industry segment such as specialty chemicals, businesses such as textile chemicals and flavours are markedly different in their business cycles and how they operate.
4.3 Definition of Variables

Operationalisation of Constructs

*Time-Lagged Subsidiary Performance (TLP)*

Time-lagged financial performance of subsidiaries is used as a proxy for subsidiary value. Company value is generally defined as a reflection of its (risk-adjusted, discounted) future cash flows, which can be expressed as a multiple of earnings.\(^{484}\) Management researchers traditionally tend to measure financial performance as return on sales or assets,\(^ {485}\) but these are without doubt highly flawed measures.

For subsidiaries this measure appears (as for many other circumstances) inappropriate, as the ‘return’ (net income) is typically a highly distorted financial performance measure that is subject to tax effects, transfer pricing and special depreciation charges. Furthermore, subsidiary profitability is for many firms a commercially sensitive measure that MNCs are not willing to disclose publicly. To derive meaningful measures, this study will therefore resort to subjective performance measures. Dess and Robinson (1986: p.271) found a strong correlation between subjective and objective performance measures (such as return on assets) and confirmed the validity of such measurement.

When assessing the value and performance of a subsidiaries it is important to consider that the first few years are typically difficult but do not necessarily reflect a failure if performance is low. This ‘valley of tears’ syndrome plagues many cross-sectional studies of subsidiaries. A way to avoid such bias is to examine the time-lagged (and averaged) profitability, 5 to 7 years after the establishment.\(^ {486}\) Another difficulty is the industry-specific magnitude of such returns. By asking managers to provide a relative performance compared to the industry-specific cost of capital should eliminate (or at least dramatically reduce) difficulties in cross-industry comparisons.

\(^{484}\) See Copeland *et al.* (2000); Company value is often measured as a multiple of expected future earnings, based on Earnings Before Interest Tax Depreciation and Amortisation, Earnings Before Interest Tax ("EBIT"), or Net Income (Price-Earnings-Ratio).

\(^{485}\) Mostly out of convenience as these are typically readily available in commercial databases.

\(^{486}\) An average of the years 5 to 7 is asked for to avoid single-year outlier effects. The motivation for the choice of this time frame is that companies at that time commonly have mastered their set-up difficulties and will be ready for growth. The time frame is long enough to capture expansion and abandonment, and short enough to still have a size-able sample (given that most subsidiaries in China were established in the mid 1990s).
The TLP measure requires the managerial assessment of a subsidiary’s operating income compared to the cost of capital on a 5-point Likert scale. The scale steps used are “Substantially higher than Cost of Capital (+2)”, “Somewhat higher than Cost of Capital (+)”, “About equal to Cost of Capital (0)”, “Somewhat lower than Cost of Capital (-)”, and “Substantially lower than Cost of Capital (-2)”. The variable is therefore defined as $TLP_k = {-2, -1, 0, 1, 2}$ for the $k^{th}$ subsidiary.

**Relative Investment Size (RIS)**

Investment size is very specific to the industry and even to the specific products. But the absolute investment amounts alone provide little insight. Even a nominally small investment might be very large if the initial capacity utilisation is minimal. Therefore, the only way to derive a relative measure is to assess all aspects by utilising a subjective measure. Doing this with the benefit of hindsight can be seen as an advantage, as over-scaling is more visible from this perspective. Hence, the problem was solved by asking experienced top managers for their assessment of the relative size of initial investment into each subsidiary on a 5-point Likert-scale ranging from “Considerably smaller than average investment (Under-sized) [-2]”, “Somewhat smaller than average [-1]”, “About average investment size in the industry segment [0]”, “Somewhat larger than average [+1]”, “Considerably larger than average (Over-sized) [+2]”. This provides a superior quality to the measure, albeit at the expense of an ordinal ($RIS_k = {-2, -1, 0, 1, 2}$ for the $k^{th}$ subsidiary) instead of a continuous measure.

**Capital Intensity (INT)**

The variable measures how much capital is allocated to property, plant and equipment in proportion to the total assets. While this is a variable specific to the parent company and relies on recent (year 2003) financial data due to unavailability of the financial statements for many of the MNCs at the time of establishment of the subsidiary, such a construct seems to be nevertheless appropriate and insightful to measure the degree to which specific companies and industries are influenced by their fixed asset infrastructure.

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487 Similar measurement as Hedlund, 1981: p.56.

488 It is similar to a measure used by Folta and O’Brien (2004: p.130), who define it as assets to total sales ratio, but the measure of assets to sales seems inappropriate for the purpose of this study. The proportion of fixed assets to total assets is deemed more consistent (balance sheet) and is comparable to a measure of sales to depreciation, which can be interpreted as (structural) expense for manufacturing. An alternative measure, the depreciation-to-sales ratio, was (unsurprisingly) found to be almost perfectly correlated. Therefore, it did not appear useful to add a second measure to the constructs.
Endogenous Uncertainty (ENU)

The endogenous uncertainty is – similar to the concept of the experience curve and decreasing marginal returns from learning\(^{489}\) – thought to follow a convex, monotonously falling function that is asymptotic to the horizontal axis that is a function of experience and time. Such a shape has strong foundations in the existing literature.

New subsidiaries, in theory, benefit from earlier experiences in the same environment by the parent company.\(^{490}\) Experience gained this way provides firms with an increased knowledge base that is known to reduce the variability of performance.\(^{491}\) Consequently, the endogenous uncertainty should be lower for subsequently established subsidiaries.\(^{492}\) However, endogenous uncertainty can never be eliminated; therefore the resolution of uncertainty by action will result in a base level of endogenous uncertainty that will remain unexplored.\(^{493}\) It is also evident that the learning effectiveness of firms will vary and external shocks can re-elevate the level of uncertainty. In general, the movement from low knowledge/high endogenous uncertainty to higher knowledge/lower endogenous uncertainty is consistent with observations in the international management literature.

From a methodological standpoint the shape of such a curve is very intuitive. It follows findings from the learning (or experience) curve, a phenomenon that is well documented in the learning literature, as well as through empirical investigations.\(^{494}\) Such an operationalisation is similar to the relationship described by Carlson (1961: p.86). The endogenous uncertainty is hence operationalised as an asymptotic curve:

\[
E_k = \frac{1}{\sqrt[1]{t_{\text{exp}(k)}} + 1}
\]

for the \(k\)th subsidiary

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\(^{489}\) See Yelle, 1979. The argument was originally introduced by the Boston Consulting Group (1972) and had substantial influence on the strategic management literature. From another perspective the work of Adler (1990) has shown that there is a substantial experience effect when transferring knowledge to new manufacturing plants.

\(^{490}\) See, for example, Johanson and Vahlne, 1977; Kogut, 1983; Li, 1995; Chang, 1995.

\(^{491}\) See March, 1991: p.83.

\(^{492}\) While a similar argument could be made for ‘other-firm experience’ (Shaver et al., 1997: p.812), the tacit and often complex first-hand operating experience in this context appears difficult to replace through ‘public knowledge’ as China, at least in the early years after the opening, was widely considered an extremely opaque environment with strong variance of practices across different provincial boundaries; see also Johanson and Vahlne (1977); Davidson (1980); and Erramilli (1991).

\(^{493}\) Barkema \textit{et al.} (1997: p.434) have found no evidence of decreasing returns to learning in their analysis of international joint ventures. This finding, however, is hardly surprising and can be easily explained by the fact that the capabilities and knowledge between countries is not transferable given the population under review (Barkema \textit{et al.}, 1997 observe outbound internationalisation, not confined to one country).

\(^{494}\) See Boston Consulting Group (1972: pp. 70-101) for an analysis of the experience (learning) effect on price movements as a result of efficiency gains.
where $t_{\text{exp}(k)}$ is equal to the number of years of local operating experience of the MNC group in China at the time of the initial investment of the $k^{th}$ subsidiary.\textsuperscript{495}

While this curve will not represent the exact uncertainty level for each firm, it approximates a general tendency that is shaped by diminishing returns on the effort to resolve residual uncertainty. An important assumption of the operationalisation of this construct is that relevant experiential knowledge gained through operating a subsidiary is fundamentally different to that gained by non-operating activities (e.g. through a representative office).\textsuperscript{496} There will be a certain commonality when establishing manufacturing subsidiaries (the exclusive focus of this study) and the experience gained through such operations has clearly more depth compared to non-operating activities. There is evidence that learning-by-doing is the primary learning mode in foreign expansion,\textsuperscript{497} which implies that a certain similarity between the activities will be helpful. This supports the validity of the measure as designed above. However, this assumes that companies share knowledge within the group.

The length of operations (measured as years in China) is often connected with internal stability and judgement capacity with regard to external developments.\textsuperscript{498} The fact that endogenous uncertainty decreases over time as more knowledge on the market is acquired\textsuperscript{499} makes the length of experience in the country a very suitable input variable for this construct.

Uncertainty is, of course, not absolute. The measure for endogenous uncertainty is therefore calculated compared to a base level within the sample (the median of the endogenous uncertainty of all entries). The endogenous uncertainty construct is defined for all subsidiaries $k$ as:

$$\text{ENU}_k = E_k - \frac{1}{N} \sum_{i=1}^{N} E_i$$

\textsuperscript{495} Example: If a subsidiary $k$ is the first subsidiary of a particular MNC to enter the country then $t_{\text{exp}}=0$ and $E_k = 1$; if the subsidiary is established 3 years after the first subsidiary, then $E_k=0.5$. The operating experience in years is a measure that is in common use in the international management literature (e.g. Song, 2002: p.201); the square root is used as a decelerating factor to approximate estimated learning speed (pilot interviews suggested that it takes 2-3 years to start understanding the environment); when sharing this reduction of endogenous uncertainty with other subsidiaries there will be a certain loss of information – hence the choice of this operationalisation.

\textsuperscript{496} This assumption is supported through research by a number of authors, incl. Song (2002: p.208) who found that "purposeful investment in certain types of capabilities – not overall local experience gained from mere presence in a location – determines the likelihood of sequential foreign investment into a host country." There are good reasons to believe that manufacturing experience is such a capability and that this is the experience that firms build on in subsequent decisions. Similarly, Eriksson et al. (1997: p.343) note that experience gained through subsidiaries provides "more differentiated knowledge of the clients and the local business."; it also assumes that all MNCs start with approximately the same level of transferable experience.

\textsuperscript{497} See Chang, 1995: 402.


\textsuperscript{499} See Kogut and Singh, 1988: p.420.
**Exogenous Uncertainty (EXU)**

An established way to measure exogenous uncertainty in strategic management as well as in financial economics research is by using a close proxy, such as the volatility of an industry index or macroeconomic volatility. The calculation of country-specific volatility would have been a useful adjustment to the industry-specific uncertainty. However, due to the lack of data for China for the earlier part of the period under review this could not be integrated. Consequently, the study will rely primarily on industry-specific as well as company-specific volatility as proxy measures (company-specific volatility measures are used where no appropriate industry measure was available).

The share price data used was retrieved from the Datastream database. As the data requirement prescribes a time series to ranges back to the late 1970s, no appropriate indices could be found to represent the industry-specific (as well as country-specific) proxy. To still create a proxy that represents the industry-risk that those subsidiaries were exposed to, customised industry indices were created where possible. For specialised subsidiaries where no appropriate industry index could be created (e.g. animal health for a chemicals firm), the parent company share price was used.

The index volatility based on weekly index data was estimated as follows. In a first step, the logarithmic returns are calculated, for $i=1,2,…,52$ ($S_i$: index value at end of period; 53 index values per year):

$$ u_i = \ln\left(\frac{S_i}{S_{i-1}}\right) $$

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500 The exogenous uncertainty with regard to future cash flows of subsidiaries would ideally be measured by the volatility over the years. There are two obstacles to this, first such volatility can only be measured on a post hoc basis, therefore it cannot serve as an independent variable for perceived exogenous uncertainty with regard to the initial structuring of the subsidiary. The other, practical problem is that such information is highly commercially sensitive and any analysis of such data – if ever obtained by a researcher – would likely cover just one or very few MNC(s).

501 Stock price indices for China’s listed companies were only created in the early 1990s. Other macroeconomic data often used such as foreign exchange volatility or changes in GDP growth rates could equally not be used for earlier part of the period under review (due to a fixed exchange rate and only yearly reporting, respectively).

502 As no country-specific indices are available for the 1980s (and this study requires consistent measures over time), industry indices have been constructed from close competitors as well as the company itself. Standard indices, such as those by MSCI (Morgan Stanley Capital International), only started coverage in the 1990s.

503 Indices have been used for engineering-type businesses (composed of ABB, Siemens, General Electric, Honeywell, and Schneider Electric), pharmaceuticals (Bristol Myer-Squibb, Fresenius, GlaxoSmithKline/GlaxoWellcome, Pfizer, Pharmacia & Upjohn, Bayer, Eli Lilly); chemicals (BASF, E.I. du Pont de Nemours, Hoechst, Ciba Specialty Chemicals, DSM, Sandoz ‘B’ shares, Dow Chemicals, Degussa); consumer goods (Unilever, Procter & Gamble, Kao, Henkel Pref. shares); photographic equipment (Eastman Kodak, Fuji Photo Film); food and beverages (Coca Cola, Cadbury Schweppes, Nestlé). All indices have equal weighting, starting on the 1 Jan 1975.

In the second step, the standard deviation is calculated as:

\[ s = \sqrt{\frac{1}{51} \sum_{i=1}^{52} (u_i - \bar{u})^2} \]

where \( \bar{u} \) is the arithmetic average of \( u_i \)s.

The time interval for the calculation is one year and the volatility \( \sigma \) can be estimated as:

\[ \sigma = \sqrt{52} \cdot s \]

However, investment in subsidiaries commonly has a long time horizon that is less sensitive to single year peaks. To mediate the impact of outliers the exogenous uncertainty measure therefore was normalised using the geometric average of the regional industry volatilities of the first operating and the two preceding years:

\[ O_{t,j} = \sqrt[3]{\sigma_{t-2,j} \cdot \sigma_{t-1,j} \cdot \sigma_{t,j}} \]

where \( t \) is first operating year of the subsidiary and \( j \) represents the industry sector.

In order to be able to interpret exogenous uncertainty, the measure has to be compared to a base level that provides an indication whether a given level of uncertainty is high by the standards of the industry in which the business operates. The base level is calculated as the median of the yearly volatilities of 25 years (from 1979 to 2003) for each of the industry sectors. This measure is defined for the \( k^{th} \) subsidiary as:\(^{505}\)

\[ EXU_k = O_k - \frac{1}{25} \sum_{j=1979}^{2003} O_{k,j} \]

**Initial Shareholding (SHA)**

The initial shareholding is measured as the percentage of ownership in the subsidiary by the MNC at the time of the initial investment.

**Equity Squeeze-Out (ESQ)**

This variable captures the change in ownership in the subsidiary over the first 5 years. The measure reflects if, and how much, the MNC is taking control of the entity. For the \( k^{th} \) subsidiary, the variable is defined as

\[ ESQ_k = \text{Shareholding}_{k,t(5)} - \text{Shareholding}_{k,t(0)} \]

where \( t(0) \) is the time of the initial investment and \( t(5) \) five years later.

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\(^{505}\) Alternative measures based on different proxies of uncertainty such as GDP growth (which is only available on a yearly basis before 1990), export volatility (equally scarce data availability), and FDI (inconclusive effects that reflect more the endogenous rather than the exogenous uncertainty), as well as different statistical estimation techniques such as GARCH (generalised auto-regressive conditional heteroskedasticity; which added no significant insight to the analysis as companies do not use such estimation) were considered but eventually dropped.
Exercise of Ownership Call Options (EOW)
This measure variable captures the exercise of ownership options and is coded as a dichotomous variable \{yes, no\}. This first requires an initial shareholding (SHA) that is below 75\% (typically the level where full control is exerted) and an increase in ownership in the subsidiary over the first 5 years on a level above 75\%.

Exercise of Capacity Call Options (ECA)
This measure indicates if substantial capacity call options have been exercised within the first 5 years of operations and is coded as a dichotomous variable \{yes, no\}. A ‘substantial’ expansion has been defined as subsequent investment being more than 50\% of the initial capitalisation.\(^{506}\) To allow better judgement and control the ECA variable is derived from detailed raw data – measuring the size of the subsequent investment compared to the initial investment GRO, as well as the timing of the exercise TIM.

GRO is defined as the amount of capital that has been invested subsequent to the initial investment in the subsidiary \((I_{\text{subsequent}})\) within the first 7 years with the objective of significant capacity expansion, divided by the amount of initial investment \((I_{\text{initial}})\):

\[
GRO_k = \left( \frac{I_{\text{subsequent},k}}{I_{\text{initial},k}} \right) \quad \text{for the } k^{\text{th}} \text{ subsidiary.}
\]

The variable will yield zero if no growth option has been exercised within the first 5 years and a positive value otherwise.

TIM measures how quickly the growth option has been exercised. TIM\(_k\) is measured as the year of the subsequent investment less the year of the initial investment, for the \(k^{\text{th}}\) subsidiary. For a growth option to be defined as exercised, the following conditions have to be fulfilled: \(GRO_k \geq 0.5\) and \(TIM_k \leq 5\).

\(^{506}\) As this definition might appear somewhat arbitrary, a 10\% variation (40\% and 60\%) was tested in the context of a sensitivity analysis. However, the chosen level does not seem to be particularly sensitive to minor changes, which led to similar results.
Control Variables

First Entrant (CFE)
First entrant is a dichotomous variable that is defined as 1 if a subsidiary company is the first foreign entrant into the market within its business activities (judged through self assessment by the companies) and zero otherwise.

Investment Year (CIY)
The variable controls for the year of investment (e.g. to capture effects such as investment booms and de-regulation of industry sectors).

Sales Destination (CSD)
In order to account for the level of uncertainty of the business prospects, and in particular revenues, the variable CSD$_k$ controls for the sales destination for the $k^{th}$ subsidiary. The original data is classified as (1) Sales within China, (2) Intra-MNC sales, and (3) Third party overseas sales – with percentage weighting for each sales destination. The categories (2) and (3) are considered to be far less risky, therefore only category (1) sales are measured with this variable.

Subsidiary Size (CSS)
The size of a subsidiary might well have considerable impact upon its financial performance (e.g. its growth rate). Subsidiary size is commonly operationalised using assets or the number of employees. The accounting value of assets, which is often used as a secondary measure for subsidiary size, is frequently misrepresented in joint ventures and does not appear to be a valid measure in the context of China. Therefore, the natural logarithm of the number of employees, a widely used measure in many studies of international subsidiaries, is used to serve as a good measure for subsidiary size. However, it is also clear that this variable might be strongly correlated with the exercise of growth options. In addition, there could be a bias towards particularly labour-intensive industries.

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507 See, for example, Mata and Portugal, 2000: p.555.
Subsidiary Group Size (CGS)
The subsidiary group size is defined as the number of manufacturing subsidiaries (both wholly foreign-owned enterprises and joint ventures) at the time when a subsidiary starts operating.\textsuperscript{508} Different to similar measures used by other authors, the focus for subsidiary group size is not to examine experience (which is already captured in ENU) but whether a growing number of subsidiaries has effects on the creation, value or exercise of options.\textsuperscript{509}

Cultural Distance (CCU)
Various studies have found that culture has an effect on the performance of international subsidiaries.\textsuperscript{510} Culture is a complex phenomenon in itself “that embodies a host of values, beliefs, and norms, many of which are subtle, intangible, and difficult to measure.”\textsuperscript{511} Hofstede (2001) found five cultural dimensions, which, although criticised for various reasons by some authors, are widely seen as an accurate approximation of cultural distance between nations.\textsuperscript{512} These comprise power distance, uncertainty avoidance, individualism/collectivism, masculinity/femininity, and long-/short-term orientation. Although it is popular in the foreign entry literature to interpret culture as an aggregated, one-dimensional construct\textsuperscript{513} this hardly seems appropriate given the complexity of the concept. The measure of cultural distance has been widely used and argued for in the international management literature\textsuperscript{514} although this practice is obvious to oversimplify\textsuperscript{515} and mischaracterises this aspect.\textsuperscript{516} It is evident that not all cultural dimensions must lead to conflict, and consequently negative performance for foreign subsidiaries.

\textsuperscript{508} Excluding build-operate-transfer or similar projects.
\textsuperscript{509} Using the natural logarithm of the number of associated subsidiaries within that country reflects the assumption that the subsidiary under review has benefited from the previous experiential knowledge of other companies at a decreasing rate; see Barkema et al., 1996: p.157.
\textsuperscript{510} See, for example, Luo and Park, 2001: p.148; Kogut and Singh, 1988: p.422.
\textsuperscript{511} Barkema et al., 1997: p.434.
\textsuperscript{512} Hofstede’s (2001) study is based on a questionnaire survey administered between 1968 and 1972 to more than 88,000 employees in more than 40 overseas subsidiaries of an American MNC.
\textsuperscript{513} Kogut and Singh, 1988 were some of the early authors aggregating the 4 (original) Hofstede cultural dimensions (later expanded to 5 dimensions).
\textsuperscript{514} See, for example, Eriksson et al., 1997: p.341.
\textsuperscript{515} One important aspect is that cultural distance is unlikely to be steady, as assumed in most – if not all – studies in international management (Chang and Rosenzweig, 2001: p.750). This, however, is very difficult to change, as alternatives to Hofstede’s (2001) measures that could be used to address this topic are not necessarily superior in quality..
\textsuperscript{516} One example for oversimplification, besides the aggregation of cultural index data, is that MNCs typically employ a variety of nationalities in their foreign dependencies. These companies will also be likely to be represented or even operating in neighbouring countries where the cultural jump might not be as high as a plain cultural distance measure based on the MNC headquarters location would indicate.
Hofstede (1989) suggested that the difference between two cultures in the area of uncertainty avoidance were likely to be the most problematic for international cooperation due to a gap in tolerance toward risk. The country of origin, which is implicitly contained in this measure, will likely affect the way the subsidiaries are managed (e.g. the degree of autonomy conceded to overseas affiliates). The variable for the $k^{th}$ subsidiary is thus defined as:

\[
CCU_k = (UA_{China} - UA_{MNC(k)})
\]

where $UA$ is taken from the Hofstede (2001) uncertainty avoidance index\(^{517}\) for the national heritage of the MNC to which the $k^{th}$ subsidiary belongs.

**Business Structure (CCB)**

MNCs have two principal governance philosophies for their foreign operations: centralised and decentralised. In a centralised business model the business is part of a command-and-control structure and has little autonomy combined with a high frequency of reporting duties. The role of the subsidiary manager is more that of a plant manager. In a decentralised model in contrast, the MNC global headquarters delegates most of the decision-making downwards in its hierarchy. As a consequence, the role of the General Manager of a subsidiary is more that of an entrepreneur. $CCB$ is modelled as a dichotomous variable ($centralised=1; decentralised=0$) and is specific to the parent company or business group, where these differ in their policy.\(^{518}\)

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\(^{517}\) In case of firms with a dual headquarters structure in two different countries or strong influence of two cultures, the $UA_{MNC}$ was defined as the average of the two.

\(^{518}\) One aspect not captured by this variable is the evolution of the governance mode over time. The governance (centralised vs. decentralised business model) has been coded as it was stated by the managers to be at the time of establishment of the first subsidiaries.
5 Theory Building: Expansion and Options

This chapter outlines the results of the empirical inquiry that is part of the inductive sphere of the research questions. It endeavours to build theory while supporting such advancements with the empirical evidence. In particular, it aims at expanding the knowledge about how real options are used in within-country foreign expansion as well as comparing practice with theoretical prescriptions.

The chapter comprises three main parts: (1) the contingency framework, an extension of the chain-of-establishment model, that uses real options logic to systematically connect uncertainty and the (capital and organisational) structure of subsidiary groups; (2) industry-specific case studies, analysing the longitudinal expansion strategies for selected MNCs from a real options perspective; and (3) an analysis of boundary conditions to the use of the real options analogy in international management.

Company Sample
A total of 41 MNCs with significant operations in China were studied empirically. These include 33 MNCs where interviews provided an inside perspective, which represents a positive response rate of 29 percent (see Appendix A for a list of companies). The highest response rates were achieved from companies in the pharmaceuticals, specialty chemicals and engineering industries. About 13 percent of companies responded negatively to an interview request (15 firms), with the lowest positive response rate among Japanese companies. For the remainder either no interview could be scheduled despite stated interest (5 firms; 4%), no response was received after repeated requests for interviews (45 firms; 39%), or the company representatives could not be reached as a result of missing contact information (15 firms; 13%). The position of the interviewee was Asia-Pacific or China Country Manager in 55 percent of the interviews, Corporate, Asia-Pacific or Country Chief Financial Officer in 27 percent of the interviews, and Director of Strategy (or similar position) for China in 18 percent of the interviews.

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519 Due to the busy schedule of the company representative and despite a stated interest to do an interview with the researcher.
520 Most MNCs in China are very secretive about their senior management personnel. Often these firms would not disclose the name or contact address of the country manager of CFO. In most cases, the successful contacting of managers has worked where the name and position has emerged through an extensive news and internet search for each firm; See Appendix B for a listing of the interviews.
521 The third category includes one interviewee who is the Head of Manufacturing in Asia, in fact a Chief Operating Officer responsible for the Asia and China region.
Eight further firms\textsuperscript{522} were studied based solely on archival data where interviews had not been granted. These are very large companies where every step was well documented in the press coverage (\textit{i.e.} on average more than 500 articles that relate to their expansion in China) and, in some cases, in-depth discussion in research reports (\textit{e.g.} Economist Intelligence Unit, 2004) so that the expansion process could be followed with reasonable accuracy. These eight firms are important to the sample as they help to provide a more complete picture for the industries under review.

5.1 A Contingency Framework for Foreign Expansion

A key realisation for evaluating expansion strategies is the seemingly simple relationship that “earlier choices constrain later ones”.\textsuperscript{523} This path-dependent view implies that the space for future strategic postures is strongly affected by earlier investment decisions. The more unfamiliar and uncertain a spatial market, the greater the benefit of a sequential entry as it allows the management of investment exposure. Expansion into a foreign market – not unlike international (‘outbound’) expansion – is a consequence of “incremental adjustments to changing conditions of the firm and its environment.”\textsuperscript{524} The framework below builds upon – and is largely consistent with – the basic ideas of Johanson and Vahlne’s (1997: p.30) conceptualisation of incremental commitment.

Organisational learning research provides a similar insightful and connected perspective. March (1991: p.71) notes that the choice between exploration and exploitation is influenced by the uncertainty (‘variability of returns’), time, and the allocation and scarcity of assets (‘distribution within and beyond the organisation’). All these factors are prevalent in the phases portrayed below.

Overview

The study of the expansion chronologies and strategies of MNCs entering China revealed a pattern of three distinct phases that will be defined as \textit{Probing}, \textit{Diversifying}, and \textit{Scaling}. The empirical evidence suggests that most MNCs structure their expansion contingent to the level of uncertainty they face.

\textsuperscript{522} The data on these firms were necessary primarily used for the comparison of expansion chronologies that is presented in \textit{Exhibit 16} (firms are coded: B2, B3, C1, C4, D4, E3, E4, E5) and as general background information.

\textsuperscript{523} Ghemawat, 1991.

The three phases in this *contingency framework* take their distinct character mainly from the different mission, structures and actions (mostly characterised by how strategic real options are used) that are prevalent among MNCs. First, it is observable that there is usually a consistent and significant gap between the first and the second subsidiary established by foreign MNCs in China (Probing phase). This investment gap represents time where the MNC learn about the market and how to operate. Such an investment pause is increasingly rare once the ‘big push’ begins. Later the focus is shifted from learning to growth. This Diversifying phase is characterised by rapid investments into a number of subsidiaries in different business areas. There is a further noticeable time lag until, ultimately, it can be observed that MNCs start to consolidate their investments, expand high performing companies and merge or abandon troubled subsidiaries (Scaling phase).

**The Options Logic in Foreign Expansion**

The studied sample reveals that firms move in certain patterns and emphasise different option types at different times.\(^525\) The way in which the investment is structured – contingent on the level of endogenous and exogenous uncertainty – represents a clear divergence from net present value and unstructured path dependence models. Real options theory, however, can provide an intuitive explanation of the observed pattern, which augments the environment-strategy-structure literature.\(^526\)

The three phases are shaped by the prevalence of different types of options that reflect the underlying strategy (see Exhibit 14). Here, the probing phase is characterised primarily by the option to learn, less by the option to expand (the latter option could have been expected), while endogenous uncertainty is very high. In this early phase, most MNCs invest carefully, rarely creating more than one subsidiary. In the Diversifying phase, MNCs appear to decide that they have understood their operating environment (having lowered the level of endogenous uncertainty) and are ready for more exposure. The underlying portfolio effect emphasises spreading the investment – not concentrating it – with multiple partners (if required) at multiple locations. Equally, each of the subsidiaries serves as a growth platform and ideally provides opportunities to grow. These subsidiaries also serve as a learning vehicle but primarily represent an option to grow the activities if they are successful.

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\(^525\) Similar to Chandler’s (1962: p.14) account, this actual patterns are not always “as clear-cut as they have been theoretically defined here.” But the underlying tendency towards these phases remains strong.

\(^526\) See, for example, Chandler, 1962; Lawrence and Lorsch (1967); Bartlett and Ghoshal, 1998. p.60.
The exercising of these options in the Scaling phase is then a clear response to a perceived change in uncertainty. MNCs understand their partner better (resulting in less endogenous uncertainty) and react to market movements that create new potentially profitable opportunities. Alternatively, an adverse change might lead to the abandonment of subsidiaries during the Scaling phase.

### Exhibit 14: Contingency Framework

<table>
<thead>
<tr>
<th></th>
<th>Probing</th>
<th>Diversifying</th>
<th>Scaling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>High level of endogenous uncertainty</td>
<td>High level of exogenous uncertainty / moderate level of endogenous uncertainty</td>
<td>Low level of exogenous uncertainty</td>
</tr>
<tr>
<td>Mission/ Rationale</td>
<td>Learn the rules / understand the environment</td>
<td>Diversify / learn / accelerate / build platform for further expansion</td>
<td>Consolidate / build economies of scale</td>
</tr>
<tr>
<td>Prevalent Option Type</td>
<td>Option to Learn</td>
<td>Options to Grow / Options to Abandon</td>
<td>Exercising of Options</td>
</tr>
<tr>
<td>Typical Subsidiary Scale</td>
<td>Small</td>
<td>Small to Medium</td>
<td>Medium to Large</td>
</tr>
<tr>
<td>General Manager Role</td>
<td>Entrepreneur</td>
<td>Entrepreneur / Plant Manager</td>
<td>‘Defender’, ‘Analyzer’ (Luo and Park, 2001); ‘Specialised Contributor’, ‘World Mandate’ (Barkinshaw and Morrison, 1997)</td>
</tr>
</tbody>
</table>

**Source:** Own analysis

Cross-case comparison (see also Exhibit 16) has led to the conclusion that the duration of these phases is dependent on the level of uncertainty that a firm is exposed to. If a firm is able to reduce uncertainty – either by effective learning or by competitive moves (e.g. creating barriers of entry) that provide improved foresight – the Diversifying phase might be shortened or even become obsolete. The increasing commitment in response to reduced uncertainty is not only reflected in level of capital investment but also in more sensitive technology and production know-how that is transferred to the local subsidiaries.527

527 E.g. interview FC14.
The Contingency Framework in Detail

Structure follows strategy, and strategy has to be adjusted to the environmental forces.\textsuperscript{528} As a result, MNCs need to adapt their organisational structure to the changing environment – and, most prominently, the uncertainty and dynamics they are exposed to. The implications of a high degree of endogenous and exogenous uncertainty (\textit{e.g.} in a nascent market environment) will often be (and certainly should be) reflected in both the group strategy as well as subsidiary set-up. From a group strategy perspective this affects the mandate assigned to the subsidiaries, the primary learning mode of the organisation, and – as the centre of this analysis – what type of options are prevalent at what time in the subsidiary group. When considering individual subsidiaries, the size of the subsidiaries can be observed to change substantially when firms move from Diversifying to the Scaling phase.

\subsection*{5.1.1 Probing}

Probing in situations that exhibit a high degree of uncertainty is not a new technique in areas such as product marketing.\textsuperscript{529} Probing typically involves an experimental probe that is used to explore the environment before an organisation has acquired sufficient knowledge to decide on the way forward.\textsuperscript{530} In China, a similar practice can be observed quite consistently across industries. Companies that want to expand manufacturing capacity, deliberately or not, typically accumulate two or more years operating experience with their first probing vehicle until they embark onto a wave of new investment projects based on the gained experience. The degree to which such a probing subsidiary mirrors the characteristics of later investments (\textit{e.g.} in terms of operating depth)\textsuperscript{531} is likely to be reflected in the applicable knowledge for later subsidiaries.

More complexity, on the other hand, will also greatly increase the risk and cost of a probe. From a strategic real options perspective such a subsidiary represents an option to learn. Numerical solutions derived by Dixit (1989) underscore the relationship that the value of the additional knowledge gained from such an option is higher than the expected loss in operating profits from waiting to invest.\textsuperscript{532} The idea of a probe is also consistent with conceptual considerations that suggest that high

\begin{flushleft}
\textsuperscript{528} See Chandler, 1962; Lawrence and Lorsch, 1967.
\textsuperscript{529} See Lynn, Morone, and Paulson, 1996: p.15.
\textsuperscript{530} A similar proposition was made by Shaver, Mitchell and Yeung (1997: p.823) who suggested that “initial investments provide outposts from which to learn about an environment.”; interview EC56; and EC85 (“first subsidiary has started as an experiment at first”).
\textsuperscript{531} \textit{E.g.} interviews EC56 (“manufacturing companies are considered better in gaining a more in-depth understanding of the market”); and EC67 (“learning can only occur by being in China”).
\textsuperscript{532} A number of assumptions apply.
\end{flushleft}
endogenous uncertainty would lead companies to invest more into exploration activities.533

In emerging market situations, the operating environment is often characterised by a high degree of uncertainty while the market is at a very early or undeveloped stage – with no or little prior experience (e.g. by a competitor, whose prior success in this market could be observed) as a reference point. The mandate of such a probing vehicle is to learn how to operate while trying to maximise profitability more on a medium to long-term horizon, and this on a group-level rather than the short-term for the first subsidiary. One corporate CEO of a European pharmaceutical company reportedly had told his managers in the early 1980s while referring to their first subsidiary in China: “If there is no profit for 10 years – I don’t care. When the market comes, we are there.”534

Such argumentation is related to ideas put forward by the first-mover advantage literature.535 While this literature generally favours high initial commitment that is incongruent with the Probing idea, they equally follow similar arguments about early learning and ‘paying to play’ – retaining options to compete in a market and avoiding a lock-out.

While employed consciously or not, a probing vehicle provides knowledge and lessons to the company that often leave a strong mark in the corporate memory.536 If the probe is successful, this could mean that MNCs would continue working with the same partner in multiple joint ventures537 or continue investing in a region (city or province) where a constructive relationship has been established with governmental authorities.538 For negative experiences, business principles can be derived to avoid the same mistake (e.g. concerning control). A senior executive of a large European chemicals company stated that their first subsidiary was “not planned as an experiment to learn how to operate in China, but many lessons learned that have been applied in later ventures. We kept to these principles – for example, always majority share, always Greenfield.”539 This is consistent with earlier observations that sequential entry is often path-dependent.540 Probing is also

534 Interview SA73.
536 See, for example, Alchemist case (interview FC14)
537 E.g. interviews SA73, FC14, and EC44.
538 E.g. interviews FC90 and FC45.
539 Interview FC14.
540 See Chang and Rosenzweig, 2001: p.773 who observed that firms have a strong tendency to replicate early entry mode in later entries (joint ventures if the first entry was a joint ventures; acquisitions if the first entry was an acquisition) in the context of European and Japanese firms entering the US market.
reflected in the Prospector subsidiary orientation, based on a Miles and Snow (1978) classification, for market-seeking subsidiaries.\textsuperscript{541}

The criterion used for the selection of the business line for the first subsidiaries entering the market was found, different to findings from Chang (1995), to be more a question of appropriateness for the companies studied. Low complexity of products and processes to make the first venture work appeared to be key considerations rather then competitive advantage (which was taken for granted in most of the cases). A consistent pattern for Probing that was performed by the MNCs studied in China was that the production technology employed was very simple (e.g. mixing, simple assembly or just re-packaging products).\textsuperscript{542} Only gradually more complex technologies and processes were phased in,\textsuperscript{543} either matching the market development or as a pre-emptive move to stay ahead of local competition. As a result, a probing subsidiary can focus on the market and the environment instead of trying to get a complicated technological process and quality right.

The level of endogenous uncertainty during this phase was typically very high. Experimentation and an exploration mode therefore characterised the first subsidiary entering the market. This was also reflected in the choice of governance mechanisms, where a high external variety was often matched by a small and flexible local unit.\textsuperscript{544} The management of a probe in this early phase was in most firms characterised as highly entrepreneurial and enjoyed a high degree of autonomy from the MNC parent shareholder.\textsuperscript{545} This observation is consistent with Birkinshaw’s (1997: p.218) finding of a high degree of subsidiary autonomy at a ‘formative stage’ as well as with propositions in the contingency theory,\textsuperscript{546} which implies that subsidiaries at a stage of high uncertainty would also enjoy a high degree of autonomy in decision-making in this phase.\textsuperscript{547} Such managerial flexibility, as required in a real options setting, is also consistent with principles developed in a number of studies such as autonomous learning (compared to directed learning).\textsuperscript{548}

\begin{footnotesize}
\begin{itemize}
\item[\textsuperscript{541}] See Luo and Park, 2001.
\item[\textsuperscript{542}] E.g. interviews EC56 (a specialty chemicals firm; “first subsidiaries were also used to understand the market better and have employed low-technology processes”); FC14 (first subsidiary: “relatively simple technology, close to the end-customer market”).
\item[\textsuperscript{543}] This is consistent with observations by Johanson and Vahlne, 1977: p.24.
\item[\textsuperscript{544}] E.g. interviews EC22; SA73; FA29; EC12; and FC90.
\item[\textsuperscript{545}] E.g. interviews SA73; EC22; FC45; and FC14.
\item[\textsuperscript{546}] See Lawrence and Lorsch, 1967.
\item[\textsuperscript{547}] This is also reflects the idea that firms organise themselves ‘organically’, rather than in a very bureaucratic way, in response to highly dynamic environments as introduced by Burns and Stalker (1966:pp.5-6).
\item[\textsuperscript{548}] See McGrath, 2001.
\end{itemize}
\end{footnotesize}
necessary speed of decision-making in high-velocity environments,\textsuperscript{549} and findings in the headquarters-subsidiary relationship literature.\textsuperscript{550}

### 5.1.2 Diversifying

Once companies have gained sufficient insights into the local business environment and substantially resolved the prevalent endogenous uncertainty, the next phase of expansion – termed ‘Diversifying’ – begins.\textsuperscript{551} Diversifying can be characterised by a variation in partners, regions, and product lines introduced.\textsuperscript{552} This is frequently done through small-scale investments that allow the company to examine whether businesses are viable in practice as well as to explore the environment.\textsuperscript{553} The economic rationale of such behaviour is that those companies that – directly or indirectly – add value would be expanded if new opportunities arise, while failed subsidiaries would be abandoned. This can be seen as a variation of the economies of scope logic, where MNCs can utilise centralised knowledge resources across their activities and create ‘synergetic’ value. Firms then learn from past mistakes and revise their expectations.\textsuperscript{554} The fact that initial profitability is for many MNCs less important than having ‘a foot in the door’ supports the idea that they see the subsidiaries in this phase as growth options.\textsuperscript{555}

Speed is a key requirement in this phase as well as to bring the company in a better position to manage uncertainty. In most cases this involves the establishment of a broad range of strategic real options (\textit{i.e.} subsidiaries) that represent a platform for further expansion.\textsuperscript{556} The size of these entities is often relatively small and provides strategic growth options for the corporation to expand locally, as well as the option to abandon subsidiaries where these turn out to be mistakes. MNCs tend to

\textsuperscript{549} See Eisenhardt, 1989a.
\textsuperscript{550} See, for example, Hedlund, 1981.
\textsuperscript{551} Diversifying should not be confused with the themes of (related/un-related) diversification in the strategic management literature sense (\textit{e.g.} Penrose, 1959: p.107; Chandler, 1962: p.78) such as the entry into new product markets, or international markets, in order to extend an organisation’s business activities. Diversifying in the context of this thesis is in its meaning derived from the financial economics literature (\textit{e.g.} Markowitz, 1959) is more about the portfolio effect and structural diversification to contain risk in separate legal entities/subsidiaries through relatively independent cash flows. It is somewhat related to multinational diversification, which is found to increase profitability (Grant, Jammine, and Thomas, 1988:p.793) and provides more stable cash flows (Rugman, 1975).
\textsuperscript{552} Such practice has an evolutionary pattern (See Aldrich, 1979: p.33) of variation, selection and retention (based on option value).
\textsuperscript{553} \textit{E.g.} interview FC96 (“see subsidiary as ‘scout’ at the market front that brings back market intelligence. This helps to improve and adjust the corporate strategy with a local flavour”).
\textsuperscript{554} As noted by Chang, 1995: p.389, this can also be brought in relation with Argyris and Schön’s (1978) ‘error detection and correction in theories-in-use’.
\textsuperscript{555} \textit{E.g.} interview EC85 (“have subsidiaries which are not expected to be growing; they are accepted as they don’t loose too much money; for the Chinese operations the pressure to be highly profitable is not as huge”).
\textsuperscript{556} See Kogut and Kulatilaka, 1994b.
diversify or parcel their entry into a number of subsidiaries where uncertainty through mandatory partners or operational environments is high.

The impetus for the start of this phase is commonly found in the global headquarters, and in the case of a ‘strategic market’\(^{557}\) such as China, usually the Chief Executive Officer – compared to the establishment of the first subsidiary, which is frequently the result of an SBU initiative.\(^{558}\) However, the necessity to establish new subsidiaries clearly depends on the company business portfolio, industry specific needs, and available capital. In regulated markets where local partners are required, most companies try out different partners in different regions in order to be hedged if some joint venture projects fail.\(^{559}\) Similarly, at this stage subsidiaries are often awarded only little capital, which provides the operation the character of a capacity option (or ownership option in joint ventures). However, the uncertainty about the outcome of such subsidiaries can be seen as an important factor that leads to the spreading of investment.

Greater uncertainty implies a higher value of the growth opportunities that in turn often leads companies to create a large number of subsidiaries to benefit from regional opportunities within the country.\(^{560}\) In such conditions, consistent with findings by Nelson (1961) and McGrath and MacMillan (2000: p.171), companies tend to deploy patterns of options, providing them with a better basis of potential growth opportunities for the country group if some projects are likely to fail. Such an approach also follows principles of the portfolio theory\(^{561}\) and financial management practice where no sophisticated investor would choose a big bet if he can lower his downside risk while keeping the same expected return.\(^{562}\) While the learning effect is certainly higher for related business activities, there is a broad spectrum of general local market knowledge that can reduce the endogenous portion of uncertainty for subsequent subsidiaries.\(^{563}\)

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\(^{557}\) Companies have often referred to China as a ‘strategic market’, a market – as has been reflected in the interviews – that from their perspective will be a crucial battleground for global market leadership in the coming decades (e.g. interviews EA36 and FC45).

\(^{558}\) E.g. interviews EA49; EC87; FA18 (“timing of investment is driving by the following factors: (1) top management (and their inclination to perceive China as an attractive market), (2) changes in regulation, (3) market development”); FC42; EC85 (“CEO wants every business to be in China”); EC12; SC95; SC50 & FC45.

\(^{559}\) E.g. interview EC87 (“went through miserable times with many JV partners”; but “learned enough over time to avoid these situations”).

\(^{560}\) China was widely portrayed by interviewed managers to be an agglomeration of different provinces that have different rules and tastes. These in some cases need separate investments. (e.g. FC42)

\(^{561}\) See Markowitz, 1959.

\(^{562}\) This assumes at least partial independence of returns.

\(^{563}\) E.g. interviews FC90; and EC83 (“[company had] founded a number of subsidiaries, most of them very small; in 1998 decided that ‘we now have some subsidiaries’, stopped then to invest in further subsidiaries, and learn first how to operate in China before establishing more subsidiaries”).
The profile of subsidiaries in the Diversifying stage was also observed to be gradually changing from an exploration (gaining new operating capabilities and investigating business opportunities) to an exploitation character (production with local adaptation). Such orientation is also apparent in the governance structure where some business groups are often directly involved in subsidiary decisions, while others take a more hands-off approach. Centralised decision-making (at the global headquarters) is often also a function of the increasing need for global integration as well as the result of industry characteristics. Subsidiaries in the Diversifying phase can in most cases be classified as ‘Local Implementers’ in the Birkinshaw and Morrison (1995) subsidiary typology (and its equivalents in earlier studies) and can be characterised by a total focus on efficiency and growth (exploration and exploitation).

5.1.3 Scaling

The Scaling phase is dominated by the exercising of so far unused options and often involves a consolidation phase to weed out non-performing entities as well as to solve structural problems and reduce complexity. The starting of the phase is frequently a response to receding exogenous uncertainty at a point where companies perceive to have relatively good foresight in a maturing industry – for example where competition by local competitors is becoming more concentrated (resulting in lower exogenous uncertainty) and where most global competitors can – at this point – be judged on their capabilities in this environment.

The building of world-class facilities in a maturing market is designed to exploit economies of scale as well as existing operating capabilities. Scaling is only valuable if uncertainty is largely resolved – otherwise it results in high downside risk exposure. At this point, capacity and ownership options that were created in the Diversifying phase are exercised. Where the company has better foresight of the

564 E.g. interview FC14.
566 Innovation-driven companies (e.g. in high technology or research-based pharmaceuticals) are often more integrated. Here, manufacturing is more a necessary step and products are relatively ‘global’ in nature. One firm had two business groups which were managed in a decentralised manner, while another business group was managed tightly from the headquarters, reflecting different needs. (interview FC14).
567 E.g. interviews EC87 (“prefer to focus now on a few trusted partners”); EC12 (all joint ventures in the companies main business were merged into one new joint-stock company); EC67 (“difficult to maintain a large number of subsidiaries because of the immense effort to control the entities”).
568 This is consistent with Bowman and Hurry’s (1993: p.767) argument that “[w]hen managers perceive low environmental uncertainty, they will be motivated to strike options”.
569 This is similar to Johanson and Vahlne’s (1977: p.30) observation that “[s]cale-increasing commitments may, for example, be occasioned by a decline in uncertainty about the market’. However, scaling involves also abandonment and is not confined to incremental processes.
factors influencing the cash flows of a potential capacity expansion (e.g. demand and supply situation) it can ramp up its output by executing the option. If the company is sharing the ownership with a partner, it will likely take control (ownership option) if the cost of the partner is seen as higher than the benefit, or, if this is not possible and the subsidiary is not commercially viable, abandon the stake and sell to the partner (‘scale down’). While uncertainty can be reduced in a number of ways (e.g. through entry barriers), if the Scaling phase is preceded by Probing and Diversifying, the company would generally have a solid knowledge basis and likely a number of good opportunities to invest in capacity in order to grow the business. Scaling also includes scope effects such as adding new product lines to an existing subsidiary platform (within the scope of the business license), which typically require more overall capacity.

Consolidation, the combination and abandonment of subsidiaries, is particularly observed in cases where the expansion has been too fast compared to the learning mechanisms in place. Such action is likely to involve short-term transaction costs (e.g. buy-out of partners, selling at a discount) in order to improve long-term value. The cost of ‘speeding’ exemplified in this phenomenon is consistent with the findings of a study of international expansion by Vermeulen and Barkema (2002), who concluded that high expansion speed would have a detrimental effect on performance of hastily established subsidiaries. An accelerated and broad-based entry – without prior Probing – could lead to diseconomies stemming from the lacking absorptive capacity to integrate and disseminate critical knowledge. On a practical note however, MNCs observed in China are keen to avoid missing opportunities even if this means deliberately taking the risk of making a few wrong decisions along the way when establishing subsidiaries; in the hope that others will be great performers. This line of thinking fits well with option principles (as long as the ‘bets’ are small). Acquisitions are another method of speeding up the consolidation and scale existing activities. However, there are clearly limits to this

570 The conditions for a buy-out of a partner was rarely found to be fixed in advance with regard to the purchase price; e.g. interview FA33 (“JV provisions typically include a ‘right of first refusal’ […] to buy out the other after a number of years (but no fixed price”).
571 Regulation in China doesn’t yet allow such consolidation in all industries (Interview EC22).
572 E.g. interviews FC45, EC87 (“prefer to focus now on a few trusted partners”) and FA18.
573 Interview FA18 (“company invested to quickly at too high a cost”).
575 E.g. interview FC45.
kind of growth as it draws on resources to both prepare acquisitions as well as to manage the post-acquisition integration.576

‘Scaled’ subsidiaries are a mature form of subsidiary company and likely to be classifiable into all three of the Birkinshaw and Morrison (1995) subsidiary categories (and equivalents in earlier studies): Local Implementers, Specialised Contributors, and World Mandate subsidiaries.577

If the subsidiary has reached a certain scale, the value of growth options are diminished on a relative basis.578 Its operations then often need more integration into the corporate network due to their dependence on technology transfer or coordination of exports made by the local subsidiary. It is typically a more integrated subsidiary where the management will have little latitude in strategic decision-making and will instead be more focused on operational effectiveness. This observation is consistent with findings by Hedlund (1981: pp.53-54) who found a curvilinear relationship between size and subsidiary autonomy, as well as Taggart’s (1998: p.675) observation that subsidiaries move from low to high integration over time.

The development from the Diversifying phase to the Scaling phase also reflects theoretical arguments made in the organisation theory that such systems generally evolve from more to less complex states.579 The consolidation of subsidiaries and the scaling of successful subsidiaries follow an evolutionary pattern that corresponds to the environment.

5.2 Subsidiary Group Size

Speed and Scaling in Emerging Markets

Moving in one large step is often quicker than moving in several smaller ones. In more mature markets, speed derives its value – at an internal level – from an organisation’s tendency towards inertia, which in turn is a result of the pent-up need for strategic changes in the face of environmental shifts.580 More dynamic markets differ in the sense that companies that do not constantly re-adjust to the environment will eventually fall behind. Such an environment requires fast decision-making

576 See also Penrose, 1959: p.211.
577 More often, e.g. in chemicals, large subsidiaries tend to have ‘Regional Mandate’, to sell to other Asian markets.
578 The growth options in small subsidiaries are typically high on a relative basis, as the basis is low; in large subsidiaries, the option for additional capacity has a much lower relative value as the investment for new capacity relative to the initial investment has less impact on the overall subsidiary.
processes to keep pace with the market speed, let alone to stay ahead of competition.\textsuperscript{581}

5.2.1 General Observations from the Expansion Chronologies
The number of subsidiaries is of particular interest for analysis as it often quite accurately reflects the expansion speed in the early phase of development. It can be observed from the surveyed sample that many companies in market-seeking manufacturing industries,\textsuperscript{582} have quickly established large portfolios of subsidiary companies. One reason for this is that, due to the way subsidiaries are regulated, it is often necessary (or at least easier) to establish a new subsidiary if the new business activity is not covered by the business license of existing subsidiaries. But this can also be interpreted as testing different partners and a trial-and-error strategy. A larger portfolio of joint ventures will also bring a considerable portion of additional complexity and partner-associated. Once the initial endogenous uncertainty is largely resolved this often leads to consolidation, either through taking control of subsidiaries or through divestments.\textsuperscript{583}

As a result of the regulatory environment, subsidiaries ownership structures were initially entirely confined to joint venture companies. When regulation on ownership was relaxed in the mid 1990s, these were soon followed by an increasing number of wholly foreign-owned companies. Joint venture companies quickly became the minority of new subsidiaries established. While most companies might not have had the desire to establish a large number of subsidiaries in China, the practical limitations on business scope – both geographically as well as for the product portfolio – resulted for many MNCs in a wide array of separate legal entities, often with an equally large number of different partners.

Driving and Restraining Forces for Subsidiary Groups
The forces to increase the number of subsidiaries are particularly pronounced in the late Probing and early Diversifying phases. These include several elements. First, the need to increase the speed of entry: a single subsidiary might not be able to grow fast enough, so creating additional subsidiaries at different locations is an alternative way to increase local capacity. Second, when more business lines seek a local presence they are likely to establish their own subsidiaries to simplify reporting as well as to

\textsuperscript{581} See Bourgeois and Eisenhardt, 1988: p.833.
\textsuperscript{582} For example in the consumer goods industry, engineering, chemicals, and diversified sectors.
\textsuperscript{583} Examples for such companies (mentioned in public media) include Unilever (Economist Intelligence Unit, 2004), Nokia and Ericsson, which drastically consolidated their shareholdings.
have a clear measure for unit performance. Third, firms need to diversify exposure (to more partners and regions) as well as to simultaneously create more options as platforms for further expansion. This is particularly prevalent if the group is depending on the partner for key value chain activities such as distribution.

The forces to decrease the number of operating subsidiaries emerge over two phases. In the Diversifying phase, companies encounter decreasing benefits to learning (if they accumulate knowledge and experience centrally). The knowledge gained through additional subsidiaries adds more insight but will increasingly include variations of existing experience in this spatial market than truly novel knowledge that is relevant at country group level. In addition, the increasing management complexity (e.g. reporting, supervision needs, dispersion of scarce management talent) raises the operating cost. The Scaling phase is likely to bring a more intense focus on cost savings. This would naturally involve a more active portfolio management: concentrating investment in existing, well-performing subsidiaries as well as the abandonment of poor performers (as discussed above).

**Exhibit 15: Ideal-Type Expansion Profile of MNCs in China**

The result of the different forces on MNC’s operations is portrayed in Exhibit 15 as path that subsidiary groups follow over time. The subsidiary group size of two consumer goods companies, a prototypical market-seeking case, is seen as a good example as these companies started relatively early and therefore relatively close to the ideal-type path. These are compared with an ideal-type slope based on

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Note: The main line represents the ideal-type development path of subsidiary group size; The dotted lines represent the number of subsidiaries of two global fast-moving consumer goods companies (1,3) and two consumer electronics firms (2,4) from their time of entry in China over a time period of 17 years; Each horizontal step represents one year, each vertical step represents one subsidiary.

Source: Own analysis; company data, Factiva news database and various internet sources

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Ideal types (attributed to Max Weber) are models or mental abstractions of processes what serve as “pure standard against which data or ‘reality’ can be compared.” Neuman, 2003: p.450.
observation and trends as well as two consumer electronics firms that represent a resource-seeking stance.\textsuperscript{585}

The counter-movement of reduction of subsidiaries can be interpreted as a situation where endogenous uncertainty has declined. As a result, there is less need for a large portfolio of strategic options, which – at that point of time – might even become expensive to hold on to. It also marks a shift from exploration to exploitation, from flexibility to commitment. MNCs in this phase prefer using their existing platform, consolidate their operations (internalisation of growth options) and shut down unprofitable operations that have no prospect for recovery (executing their option to abandon).

**Discussion of Propositions**

The empirical evidence is consistent with the propositions developed in the conceptual framework. The findings, although only indicative, support the principles outlined in *Proposition 1* that group size should follow exogenous and endogenous uncertainty. Lower uncertainty requires less diversification and fosters consolidation that reduces the size of the subsidiary group.

Equally, the observations in this chapter support *Proposition 2* that made the case for a bell-shaped curve for the development of subsidiary groups, where the optimal number of subsidiaries is a function of the level of uncertainty. These findings also provide corroborating evidence for the proposed contingency framework.

**Subsidiary Group Size and Subsidiary Autonomy**

From the MNCs studied (in particular the 33 firms where internal information was available), a trend can be identified: the smaller the number of subsidiaries in China, the more likely an entrepreneurial role can be found. Some firms reported different arrangements within their China subsidiary group, where there was a difference either with regard to size – smaller subsidiaries managed more entrepreneurial, larger subsidiaries tightly controlled – and with regard to different industry logic – where one business group (Chemicals) required a global management of resources and another (Pharmaceuticals) was more locally oriented.\textsuperscript{586}

The findings broadly fit into the conceptual framework presented by Birkinshaw and Hood (1998: p.775), that outlines subsidiary evolution as interactions

\textsuperscript{585} Resource-seeking firms reflect the ‘null hypothesis’ development, as uncertainty for export processing firms is relatively low (more industry-specific than country-specific).

\textsuperscript{586} Interviews FC14 and EA49.
between the head-office assignment, subsidiary choice (decisions made by subsidiary managers), local environment determinism and the subsidiary role. However, for the companies that have been studied in this investigation, the decisive factors appeared to be primarily the uncertainty and velocity of the local environment, and, as secondary factor, the size of the subsidiary and the related need for global integration. For many companies a gradual shift from an entrepreneurial approach in the early phase (Probing/ Diversifying phase) to an operational effectiveness approach in a more mature phase (Scaling phase) could be observed. This shift, and the observation that uncertainty might be the decisive factor that is responsible for the change of the subsidiary charter, has so far received little attention in the literature.

### 5.2.2 Patterns in the Expansion Chronologies

The following table (Exhibit 16) presents a more detailed comparison of the expansion profiles of 31 large multinational companies. Such tabulation can reveal a number of important findings. First, it is clearly observable that there is typically a substantial time gap between the first subsidiary and the second in the magnitude of several years (24 of the 31 MNCs exhibit such a gap). This is particularly pronounced for early entrants (in the 1980s) while later entrants appear to have decided to localise their operations quickly. Second, there is a clear pattern that early movers used Probing while late movers – usually in the years of the Chinese ‘gold rush’ after Deng Xiaoping’s legendary ‘Southern Voyage’ in 1992 – directly went into the Diversifying phase, apparently with the belief that they had learned enough from observing their competitors. Third, there is not a clear line between Diversifying and Scaling and the two can go in parallel. But Scaling will come at a later stage than Diversifying, as it is typically induced by both low exogenous and endogenous uncertainty. Scaling was in none of the cases observed to come first.

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587 E.g. interviews SA73 (“the role of subsidiary general managers has evolved from a highly entrepreneurial role in a decentralised organisation […] to that of a plant manager focused on operation effectiveness; [our company] is lacking entrepreneurship today. It is a very important question how to exercise the governance of subsidiaries without stifling the entrepreneurial spirit”); FA18 (“Subsidiaries are increasingly centrally controlled and therefore the level of autonomy is receding”); FC45 (“In the early phase, the JVs were relatively independent (sharing no knowledge and uncoordinated). Later there has been a transfer of power from the global HQ to the China HQ; business development is now done in the China HQ, which has also a strong say on new investments and product introductions”).

588 The identities of the companies have been concealed in order to shield the information provided by interviewees.

589 These include companies that are part of the sample as well as other companies that have a well documented chronology in China.
## Exhibit 16: Comparison of Expansion Strategies

<table>
<thead>
<tr>
<th>MNC</th>
<th>Phase of Expansion</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chemicals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Probing: One (1986), Diversifying: Many (From 1993), Scaling: New ventures, Some old (2000s)</td>
<td><strong>Probing</strong> – simple non-core business; <strong>Diversifying</strong> – business groups were instructed to test the waters as explicit preparation phase for the planned <strong>Scaling</strong> phase – construction of world-class plants</td>
</tr>
<tr>
<td>A&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Probing: One (1988), Diversifying: Several, some large (From 1994), Scaling: Some (2000s)</td>
<td><strong>Probing</strong> – specialty chemical business; <strong>Diversifying</strong> – trying different partners; <strong>Scaling</strong> – construction of world-class plants</td>
</tr>
<tr>
<td>A&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Diversifying: One, expansion of existing (2004)</td>
<td><strong>Diversifying</strong> – global acquisitions - followed by a broad entry - led to an even larger portfolio; <strong>Scaling</strong> – New multi-business group production location; massive expansion of other sites</td>
</tr>
<tr>
<td>A&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Scaling: Several (From 1992), Most (2000s)</td>
<td><strong>Scaling</strong> – massive capacity expansion, closure of one plant; Global acquisition adds more subsidiaries</td>
</tr>
<tr>
<td>A&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Late starter – following customers / reduced uncertainty; no probing; over-scaling of capacity of early subsidiaries; later further expansion</td>
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<tr>
<td><strong>Consumer Goods</strong></td>
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<td></td>
</tr>
<tr>
<td>B&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Diversifying: One, Many (From 1989), Consolidation (2000s)</td>
<td><strong>Diversifying</strong> – largely uncoordinated entry; little communication between categories; <strong>Scaling</strong> – massive consolidation in the early 2000s: buyout of joint venture partners, abandonment of subsidiaries and building of new world-scale production plant</td>
</tr>
<tr>
<td>B&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Probing: One (1988), Diversifying: Many (From 1993), Scaling: Some (From 1998)</td>
<td><strong>Probing</strong> – single category, simple product, focussed business activities (joint venture with two partners: local / Hong Kong with China trading experience); <strong>Diversifying</strong> – expansion of portfolio – new subsidiaries, with established Hong Kong partner; <strong>Scaling</strong> – restructuring of joint venture – buying out (partially) Hong Kong partner</td>
</tr>
<tr>
<td>B&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Diversifying: One, Scaling and Consolidate (1990s)</td>
<td><strong>Diversifying</strong> - acquisitions in 1990s to accelerate, later abandoned unprofitable ventures in 2000s</td>
</tr>
<tr>
<td>B&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Probing: Two (1994), New ventures (1997)</td>
<td><strong>Probing</strong> – three years of supply chain development before the establishment of probe; <strong>Diversifying</strong> – only few additional subsidiaries set up, acquisition of local competitors; <strong>Scaling</strong> – buyout of partner stakes</td>
</tr>
<tr>
<td>B&lt;sup&gt;5&lt;/sup&gt;</td>
<td><strong>Probe</strong> – two non-core businesses (no permission for local production in main business); <strong>Scaling</strong> - pre-empted competitors and created effective entry barriers that reduced uncertainty; CEO-led push into China</td>
<td></td>
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</tbody>
</table>

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590 See Alchemist Case Study (Section 5.3.1 - Selected Cases in the Chemicals Industry).
591 See Giant Case Study (Section 5.3.1 - Selected Cases in the Chemicals Industry).
592 See Beauty Case Study (Section 5.3.2 - Selected Cases in the Consumer Goods Industry).
593 Based on publicly available information; augmented through case study by Luo, 2001b: pp.123-126.
594 See Flash Case Study (Section 5.3.2 - Selected Cases in the Consumer Goods Industry).
### Exhibit 16: Comparison of Expansion Strategies

<table>
<thead>
<tr>
<th>MNC</th>
<th>Phase of Expansion</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Probing</td>
<td>Diversifying</td>
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<tr>
<td><strong>Engineering</strong></td>
<td></td>
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<tr>
<td>C1 (^{595})</td>
<td>One (1984)</td>
<td>Some (From 1992)</td>
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<tr>
<td>C2</td>
<td>One (1987)</td>
<td>Many (From 1995)</td>
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<tr>
<td>C3</td>
<td>One (1988)</td>
<td>Many (From 1994)</td>
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<tr>
<td>C4</td>
<td>–</td>
<td>Many (From 1991)</td>
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<td></td>
<td></td>
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<tr>
<td>C5</td>
<td>–</td>
<td>Many (From 1992)</td>
</tr>
<tr>
<td><strong>Pharmaceuticals</strong></td>
<td></td>
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<tr>
<td>D1</td>
<td>One (1985)</td>
<td>Some (1991)</td>
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<tr>
<td>D2</td>
<td>One (1987)</td>
<td>Some (From 1995)</td>
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<tr>
<td>D4 (^{596})</td>
<td>One (1989)</td>
<td>Some (From 1993)</td>
</tr>
<tr>
<td></td>
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<tr>
<td>D5 (^{597})</td>
<td>One (1991)</td>
<td>–</td>
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595 Based on publicly available information (e.g. Factiva news reports) and a case study portrayed by Luo, 2001b: pp.172-175.

596 See Healer Case Study (Section 5.3.3 - Selected Cases in the Pharmaceuticals Industry).

597 See Cure Case Study (Section 5.3.3 - Selected Cases in the Pharmaceuticals Industry).
### Exhibit 16: Comparison of Expansion Strategies

<table>
<thead>
<tr>
<th>MNC</th>
<th>Probing</th>
<th>Diversifying</th>
<th>Scaling</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Telecom Equipment</strong></td>
<td></td>
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</tr>
<tr>
<td>E1</td>
<td>One (1985)</td>
<td>Many (From 1994)</td>
<td>Some (From 1998)</td>
<td><strong>Probe</strong> – acquired 1987 from another foreign investor; capacity quadrupled by 1992 <strong>Scaling</strong> – investing to expand its many subsidiaries from 1998; consolidation from 2000</td>
</tr>
<tr>
<td>E2</td>
<td>One (1987)</td>
<td>Many (From 1993)</td>
<td>Some (Late 1990s)</td>
<td><strong>Probe</strong> – important partner, medium sized investment, core business activity <strong>Diversifying</strong> – massive investment wave by a large number of business groups</td>
</tr>
<tr>
<td>E3</td>
<td>–</td>
<td>Many (From 1990)</td>
<td>Some (From 1992)</td>
<td>First investment very large in return for wholly owned status, an exemption to the regulations at that time; this measure would reduce uncertainty <strong>Diversifying</strong> – many joint ventures (many with small investment) in different business areas and provinces; later venture capital investments <strong>Scaling</strong> – first plant investment staged over several years; announced additional investment: USD 120m (1992), USD 100m (1993), USD 360m (1994)</td>
</tr>
<tr>
<td>E4</td>
<td>–</td>
<td>Several (From 1992)</td>
<td>Some (From 1998)</td>
<td><strong>Diversifying</strong> – rapid establishment of a broad range of joint ventures in a variety of business lines <strong>Scaling</strong> – expansion of existing joint ventures; concentration of manufacturing and trading capabilities</td>
</tr>
<tr>
<td>E5</td>
<td>–</td>
<td>Several (From 1992)</td>
<td>Consolidate (2000s)</td>
<td><strong>Probe</strong> – small joint venture <strong>Diversifying</strong> – a number of JVs and WFOEs with different partners in different provinces; later also venture capital investments <strong>Scaling</strong> – laid off 5% of staff; about to merge 4 joint ventures; expanded most facilities</td>
</tr>
<tr>
<td><strong>Diversified Firms</strong></td>
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</tr>
<tr>
<td>F1</td>
<td>One (1984)</td>
<td>Some (From 1991)</td>
<td>Some (1990s)</td>
<td><strong>Diversifying</strong> – investments in otherwise unconnected business operations</td>
</tr>
<tr>
<td>F2</td>
<td>One (1990)</td>
<td>Many (From 1994)</td>
<td>Some (1990s)</td>
<td><strong>Diversifying</strong> – more than 30 subsidiaries with mostly small investments <strong>Scaling</strong> – organic growth through capacity expansion and acquisition as ways to grow the existing business</td>
</tr>
<tr>
<td>F3</td>
<td>–</td>
<td>Many (From 1990)</td>
<td>Some (1990s)</td>
<td>Only part of the merged company displayed <strong>Diversifying</strong> – rapid push into China with a number of small entities in various industries <strong>Scaling</strong> – expansion of successful companies; acquisitions</td>
</tr>
<tr>
<td>F4</td>
<td>One (1993)</td>
<td>Many (From 1995)</td>
<td>Some (2000s)</td>
<td><strong>Diversifying</strong> – more than 20 JVs and WFOEs in different areas; mostly small size investments <strong>Scaling</strong> – large scale investments (new subsidiaries) in the early 2000s</td>
</tr>
</tbody>
</table>

**Notes:** Dates refer to announcement date (typically start of construction); start-up of operations usually started 2-4 years later; Probing venture has at least 2 years experience before the next subsequent entry; Number of subsidiaries: some = 2-6; several = 7-12; many > 12

**Sources:** Interviews; Economist Intelligence Unit, 2004; news reports; internet (e.g. corporate web sites); existing case studies in Luo (2001b); own analysis
5.2.3 Development of Uncertainty over Time

The level of market opacity can be assumed to follow a similar development pattern for most companies: highest in the early 1980s when the first entrants were struggling to operate in this highly opaque environment, and slowly receding over time while bystanders were closely following the developments. This development is directly linked to endogenous uncertainty of the foreign entrants.

Exhibit 17: Country-Specific Volatility in China (1993-2004)

Exogenous uncertainty is industry (and country) specific – as a result, the later a MNC enters, the more mature the market and the lower exogenous uncertainty (in tendency; of course there will still be uncertainty shocks, discrete events that disrupt the market or the company).

Declining exogenous uncertainty is also a result of a maturing industry environment (typically through concentration). The early phase of technology adoption is often characterised by the emergence of start-ups and irrational market participants that create additional volatility in otherwise (globally) mature industries, either by aggressive pricing or other unsustainable techniques.

Particularly in the early stage of development, investors who wait out uncertainty are receptive to market signals. Signalling of new opportunities (Kogut, 1991: p.30; Bowman and Hurry, 1993: p.769) is certainly present for the creation of options. The Chinese ‘gold rush’ in the mid 1990s is reminiscent of earlier episodes in
international business where managers were entering a market, sometimes with little preparation, because they did not want to be left behind or judged old-fashioned.\textsuperscript{598} As in the financial markets, such behaviour raises volatility. When companies grow and industries become more concentrated, the environment equally becomes more predictable. This means that at a late stage of subsidiary development there would be less downside risk but also less upside opportunities.

Such a declining trend of exogenous uncertainty is visible from the relative volatility index (country volatility in comparison to the volatility of the MSCI world index) as depicted in Exhibit 17. The quadratic regression slope suggests that the market volatility in China is generally receding, despite temporary volatility shocks caused by the Asian financial crises and the overheating economy through excessive investment practice in the early 2000s.\textsuperscript{599}

5.3 Case Studies of MNCs in China and their Industries

This section will outline the entry and expansion of six large multinational companies in China. The underlying industries – chemicals, pharmaceuticals and consumer goods – provided different opportunities at different times (e.g. through regulation) and are therefore not outright comparable in their strategies. The main purpose of this section is, however, to assess how these companies managed the high level of initial uncertainty as well as whether they have made use of an options approach.

The discussion of industry characteristics and the expansion paths focuses on the different reactions by MNCs to the Chinese environment. The cases have been selected to be exemplary strategies or to contrast other portrayed companies.\textsuperscript{600} The comparison across these cases and the relation to the environment provides new perspectives for the strategic-options perspective and supports the proposed contingency framework.

\textsuperscript{598} A similar situation has occurred when American companies rushed to invest in Europe during the late 1950s. Purely non-economic reasoning was suspected in some of the cases which “induced some managers to follow suit because the did not want to be judged old-fashioned” (Stopford and Wells, 1972: p.20).

\textsuperscript{599} China’s stock markets are generally seen more as a ‘casino’, where investor place bets not founded by objective valuation. The index used, however, represents the shares traded on exchanges outside of Mainland China (mostly at the stock exchanges in Hong Kong and New York) and therefore be considered more adequate for such assessment.

\textsuperscript{600} The cases were not referenced with the codes of the interviews to ensure anonymity of statements of other statements in the text.
5.3.1 Selected Cases in the Chemicals Industry

A) The Mechanisms of the Global Chemicals Industry

The Chemicals Industry

The chemicals industry can be broadly classified into base chemicals (mostly producing commodity products) and specialty chemicals. The two areas follow opposite business logics: base chemicals business is characterised by high volume, low margin processing of standardised products (e.g. naphtha). In contrast, the specialty chemicals business is characterised by low volume, high margin production of (for the most part) tailored solutions to client firm needs (along exactly defined specifications). The following section is dedicated to firms active in specialty chemicals.601

Specialty Chemicals

The specialty chemicals industry is – for its greater part – a relatively decentralised business, where the different products (e.g. coatings, performance chemicals and resins) typically cater to entirely different customer groups. While there are some synergies between business units, the businesses are often more dependent on the business cycle of the customer industry (e.g. mining, automotive, textile) as this drives the demand and, ultimately, revenues.

Central strategic issues in specialty chemicals firms are the capacity utilisation of manufacturing sites, innovation, uncertainty about raw materials prices and economic cycles in different customer industries. Chemicals firms typically have large cost blocks in both manufacturing infrastructure (which are often shared across different SBUs). These are often highly scalable and modular, which allows staged investments. The main raw material sourced by specialty chemical companies is either petroleum or natural oil (e.g. coconut or palm oil), which are subject to heavy price fluctuations. The revenue side of most specialty chemical companies is often more predictable due to the tendency to offer products for a number of relatively independent customer industries (e.g. there is little correlation between the cycles in the mining and the textile industry). As a result, it is certainly favourable to operate in a portfolio of business areas in specialty chemicals (based on similar process technologies and raw materials) as well as to use multi-functional chemical plants that cater several business groups.

601 Base chemicals has been excluded in the definition of the population as it is a high capital-intensive industry, following a different business logic that might not be as suitable to a real options rationale.
This, however, is not always possible in the context of China. On the other hand, there are typically also a number of businesses, where economies of scale are not as critical, that can be effectively operated through small subsidiaries. Due to the relatively limited synergies in many specialty chemicals companies a dispersion of activities appears to be relatively easy to accomplish.

A) The Case of Alchemist’s Expansion in China

Alchemist, a large multinational chemicals and pharmaceuticals company with its corporate headquarters in Europe, has organised its entry into China in distinct phases: a preparation phase, an experimentation phase, and a world-scale investment phase.

The preparation phase for the entry into the Mainland China market was strongly influenced by the establishment of an early joint venture in the late 1980s. At this time the prospects of the overall market were not clear. Although it cannot be claimed that it was planned as such, this first subsidiary served as a training ground and exploration vehicle for what was to follow. Similar to other MNCs, Alchemist’s choice of the first operating business entity in Mainland China was primarily an opportunistic act where an investment opportunity had been offered by the Chinese government authorities in return for technology transfer. Furthermore, the entity operated in a non-core business of the Alchemist portfolio what might have lowered the potential fallout from a failure of the business. The business characteristics proved ideal to study the environment for the other Alchemist business lines and as a learning platform to gain operating capability: First, it used a mature (in developed markets) and simple technology where few complications were to be expected from the production itself. Second, it was operating close to the end-consumer market, which allowed better visibility of the underlying market trends. These characteristics made this first Alchemist subsidiary in China (after the re-opening of the market) a fertile learning probe.

As a result, a number of investment principles were derived from this early experience: always Greenfield investments and majority stake in new subsidiaries –

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602 A code name. The case study is based on two recent interviews and one interview in the year 1999 (the latter is not included in the list of interviews) – all interviewees were at the China Country Manager or China Country CFO level and all interviewees have extensive experience in China in covering most of the portrayed time period. The information given was consistent with publicly available information. The information was corroborated and augmented through numerous press reports and internet sources. As the process is mostly based on observable facts and developments that only to a very limited degree subject to interpretation by the interviewees, the number of interviews appears sufficient as the information was triangulated, often multiple times, through alternative sources. However, the final text inevitably reflects to some degree the author’s interpretation of the company’s chronology in China.
to have more freedom in strategic decision-making. A long gap followed until new investments were undertaken. Environmental uncertainty, a generally cautious attitude among multinational companies about future political developments and a continued opening of the market were some of the reasons. However, for most of the time Alchemist was actively investigating the environment further and investigating new development of market segments, partners and potential sites for production plants.

The ‘first phase’ of new investments that followed started during the so-called ‘gold rush’ in the mid 1990s, when most large MNCs – including a number of direct competitors – began investing heavily in China. At this point, the corporate board member responsible for Asia and China was pushing the different business groups to make proposals for local production in China, and to then implement these plans if approved by the management board. In this phase, the business groups were only allowed to invest up to USD 30 million,\(^{603}\) which represented the official threshold level at that time – above which investment would require central government approval. The investments were a conscious effort to further explore and test the Chinese market and investment climate. The low investment sum would also expedite the approval process of setting up the ventures as they could be cleared by authorities at the local or provincial government level. The subsidiaries were seen as experiments with different partners in different regions (as well as testing the working relationship with provincial authorities). In this phase, Alchemist established 9 new subsidiaries within a time period of only two years.\(^{604}\) As a result, Alchemist had developed a highly diversified portfolio of subsidiaries – various business groups, various locations, and various partners. In subsequent years, those subsidiaries that were going well were further developed and expanded. Manufacturing facilities had in many cases been designed in a way that would allow capacity expansion at relatively little extra cost and usually included a land reserve.

Part of the push into China was the establishment of a holding company in 1994 to oversee and support the investment activity. This structure had the advantage that all new equity shareholdings were directly controlled by the China holding, providing clear ownership and reporting lines. The entry was primarily driven by the business groups, which provided the technical support from other

\(^{603}\) There have been two exceptions of joint ventures with higher investments than USD 30 million which were announced in the news during the ‘experimentation phase’. But the approval process took so long that they did not begin operating until the next phase had started.

\(^{604}\) Based on press reports. Operations might not have started within these two years.
global locations. The role of the holding was that of a centre of excellence in number of corporate functions (such as finance, legal, tax, corporate development) to support and develop the subsidiary group and the corporate presence in China.

The ‘second phase’ of investments started in the early 2000s and focused on large-scale world-class production plants. The investment amount for these subsidiaries is substantial by global standards. While a failure of an investment in the first phase would have had a minor financial impact on the corporate balance sheet, the stakes in the second phase are at a level that a failure would lead to a substantial financial shock at the corporate level. In this phase, Alchemist has also introduced more know-how and more sensitive state-of-the-art technology. The decision on where to invest is based on the experiences of the preparation phase (Greenfield, majority) and the first investment phase, which explored which partners are good to work with and where governmental relations are constructive. Different to the first phase, the investments – at least for the biggest of the Alchemist business groups active in China – are not dispersed but rather clustered in one industrial park.

The organisational set-up was also managed dynamically: smaller ventures were managed more entrepreneurially, later when becoming more mature they became more centrally controlled. The initial entrepreneurial and strategic role of the China holding company later evolved into a financial holding role, once subsidiaries became more integrated into the global network.

The Options Perspective
The case of Alchemist exhibits a clear sense of learning and options thinking. The company has, where it was possible, consistently started small while endogenous and exogenous uncertainty was high (creating capacity options) and expanded when endogenous uncertainty was substantially reduced and revealed a positive outlook for incremental investment (exercising of capacity options). Similarly partners have been bought out – *i.e.* exercising ownership options – where the joint venture partner did not add value or was restricting decision-making, as soon as the regulations allowed such action.

The first subsidiary, capitalised only with a small investment amount, represents an option to learn. It was a non-core business that could neither serve as a platform for further growth (and was subsequently abandoned as part of a global portfolio reorganisation) nor had great prospects for high financial returns. While not explicitly intended for that purpose of learning, it fulfilled this role and provided crucial and very valuable knowledge and capabilities to the organisation.
C) Giant’s Expansion in China

Giant, a European chemicals company, started manufacturing in China in 1988 with a small joint venture for coatings. While the first manufacturing foothold was not explicitly designed to be a trial in itself, it provided many insights for further investments.

After an investment pause of 6 years, the company established 6 small and medium-sized subsidiaries in the mid 1990s within a time period of 3 years. All of them were majority-owned joint ventures with different partners. The company at this stage entered partnerships with local producers opportunistically where those represented promising projects. The company reduced revenue uncertainty by investing only in plants where a sufficient volume of exports to China already existed so that the local subsidiary would substitute this capacity. This requires a substantial amount of coordination and global strategic capacity planning.

The company had long operated from its Hong Kong base but gradually shifted its operations to the mainland when sales and marketing were allowed to be coordinated on the holding level. Particular in its base chemicals businesses, the investment in capacity also serves the purpose of deterring competitors from entering as well as to ‘leap-frog’ them in a rising market environment. The risk of overcapacity is affecting firm and industry profitability. Economies of scale are critical for most of the company’s product lines. As a result, all companies in this space are very attentive to new capacity to be started up and often react to such moves.

Giant is unusual in its management of its China organisation as it has a corporate board member based in Shanghai, who oversees the Asia/Pacific region. This allows fast decision-making and better insights of the business environment up to the highest levels of authority. Such capacity for accelerated informed decision-making is certainly seen as a great advantage – not only within the own company but also respected as superior system by competitors.

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605 A code name. The case study is based on one interview with a senior executive of this company overseeing the Chinese business operations who was closely involved in the development outlined in this text as well as an interview conducted in 1999 (the latter is not included in the list of interviews) with a senior executive of the Giant’s China holding company. The information provided during the interview was consistent with publicly available information. It was corroborated and augmented through numerous press reports and internet sources. However, the final text inevitably reflects to some degree the author’s interpretation of the company’s chronology in China.

606 It is likely that the pause between 1988 and 1994 – like that of many other firms – is to a substantial degree due to the Tiananmen incident, and that investment only gained momentum again in the wake of the investment boom following the Deng Xiaoping’s ‘Southern Voyage’ speech in 1992.

607 There are some, though few and mostly much smaller companies, who have a similar set-up.

608 Interview with EC32.
The Options Perspective
Giant started probing with one of its businesses and had waited for a relatively long time learning and preparing until the company considered the time right for further investments. The different joint ventures with varying partners actively reduced endogenous uncertainty and created a number of strategic options. Giant would, through its good relations with its partner firms in the early phase, have more and better-understood opportunities than rival firms without this exposure. The joint ventures would also in some cases provide the option to grow the joint business to a large scale. Overall, the investment was structured systematically and provided an excellent basis for corporate expansion in China. The central involvement and coordination through the most senior level of corporate management (board of directors) also underlines the strategic importance given to the different projects.

5.3.2 Selected Cases in the Consumer Goods Industry

A) The Mechanisms of the Consumer Goods Industry
The consumer goods industry comprises a number of sub-segments that have very different operating characteristics. Consumer goods companies are largely driven by marketing, brand management and distribution capabilities. Few companies are integrated to control the retail level, which is usually the domain of specialised branded product vendors. Fast moving consumer goods, which typically include segments such as food and drinks, home care, and similar segments, are sold mostly through supermarket chains. Category and channel management are therefore two of the key foci for managers.609

The manufacturing itself is of less importance to the management – which has been clearly reflected in the discussions with multinational managers. Speed and the ability to act quickly were pronounced to be essential in this environment.610 However, increasingly low manufacturing cost are also becoming a competitive advantage for consumer goods firms as local firms are improving the quality of their products as well as their marketing skills.611

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609 Interview FC45.
610 Interview FC45; SC76.
611 See Economist Intelligence Unit, 2004: p.104.
B) Flash’s Expansion in China

Flash, an American consumer goods company, has long tried to enter the market in China with its core business. In the 1980s, this market segment had been restricted for foreign companies who were only allowed to export to China while paying high import duties. As a result, until 1993 the company had only a minor presence in China and no manufacturing joint venture.

The competitive landscape in China for this industry consisted of a few large state-owned enterprises that were all reported to be inefficient and loss-making. These companies were struggling with quality issues and Flash, as well some of its competitors, had sold manufacturing equipment to them. Over the years, Flash had lost substantial market share in China to its main global competitor who had built a distribution network that was substantially ahead of Flash’s own.

With a new CEO arriving in 1993, the company reassessed its markets and realised that China would be the potentially largest market for its products in a few years time. The new CEO was a former chief executive of Motorola, which had enjoyed great success with its approach to China. China, from now on, was on the CEO’s agenda and frequent meetings with Chinese government authorities followed.

Later the following year, the CEO of Flash announced a company-wide initiative to enter China, led by one of his most senior managers who would report directly to him. In the same year, the company launched its first subsidiary – a large joint venture for components (total investment of USD 140 million). This first investment was soon followed by a small wholly-owned enterprise (USD 5 million) in an export-processing zone. Both ventures could, however, only partially support but not directly penetrate the main market for Flash products in China. The company decided to push into China and in 1994 started to negotiate with the Chinese government about a transformational entry into the market.

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612 A code name. The case study is based on one interview with a senior executive of this company overseeing the Chinese business operations and closely involved in the development outlined in this text. The information provided during the interview was consistent with publicly available information. It was corroborated and augmented using information gained through numerous press reports, a company presentation and various internet sources. As the process is mostly based on observable facts and developments that only to a very limited degree subject to interpretation by the interviewee, one interview appears sufficient as the information was triangulated, often multiple times, through alternative sources. However, the final text inevitably reflects to some degree the author’s interpretation of the company’s chronology in China.

613 In 1984, Flash had transferred technology to one of the Chinese local competitors in return for a license to market its products in China. Upon completion of the Flash-designed factory (in 1988) the Chinese company would be banned for 4 years to export its products. The key global competitor of Flash had long been reluctant to transfer technology, but was anxious to be left behind if it did not follow Flash.
In 1997, the company reinforced its China management team by assigning one of its top four executives, who served as assistant chief operating officer for the global company, to Hong Kong. Furthermore, the firm replaced its China country manager with the aim of accelerating the push into the country and negotiating a favourable deal with the Chinese government. As a result of the negotiations, Flash announced in 1998 that it had acquired the assets of 5 of the 7 leading state-owned companies in the industry. It shut down part of the operation while consolidating the remaining businesses. An additional capital investment of about USD 600 million was pledged to develop the acquired businesses, in which Chinese shareholders had a small minority investment.

The transaction meant that Flash would take capacity out of the market and take on the restructuring of the Chinese state-owned enterprises to make them profitable. One of the concessions gained in the negotiation with the Chinese government was that no other foreign company would be allowed to establish manufacturing operations in China during the following four years.

The management is convinced that “certain investments in China […] require ‘big bets’” and was confident at the time that the market would be the largest in the world over time for its products. It had shared ownership of joint ventures with the Chinese government for five years and felt that “a meagre bet or trepid approach would not have been successful…or accepted by the Central Government.”

**The Options Perspective**

Flash was able to create effective entry barriers through an agreement that would grant it a virtual – though temporary – monopoly by moving early. This agreement dramatically reduced the uncertainty and warranted a large investment – instead of a small and careful one. The foreign competitors were considered a much bigger threat than the remaining local competitor. By entering into this agreement with the Chinese authorities to grant the company four years of exclusivity as the only foreign investor in its industry sector, Flash would be able to consolidate its position and develop a low-cost production base that foreign competitors would need some time to match.

Without such an agreement this would have meant the following: an early mover enters an immature industry, which will clearly have a very high level of exogenous uncertainty. This means substantial downside risk but also upside opportunities. In option terms, this has great value if it is not offset by a too large investment with high capital cost. In contrast, a late mover would encounter lower
exogenous uncertainty, and as a result, his options to grow would have less value. Through its contract with the Chinese government authorities, Flash was able to reduce uncertainty dramatically. This represented a first mover advantage. Any capacity options – at least of the time of exclusivity – would have drastically reduced value to Flash. However, the total value (NPV + option value) was greater.

For other projects within China the company “hedge[s] risk by the amount of funding provided to projects. They earn the right for more investment based on performance”. This clearly resembles a portfolio investment approach following real option principles.

C) Beauty’s Expansion in China

Beauty, a European consumer goods company, established its first subsidiary in China – a joint venture producing soap – in the mid 1980s. The initial entry, as well as that of many of the following subsidiaries, was driven by its global category (business group) management. The general manager in the early stage of expansion was granted a relatively high degree of autonomy and all subsidiaries had their own sales and distribution network. The choice for the first locally manufactured product, however, was later seen as a mistake as it left little room for differentiation against foreign and local manufacturers.

Two new subsidiaries were established in the late 1980s, followed by a large wave of new subsidiaries in the middle of the 1990s. Categories at that time undertook little effort to coordinate their activities or learning in China. Consequently many mistakes were repeated when category after category entered China. One of the biggest problems for Beauty, as it emerged, was a lack of control. Most of its joint ventures were managed by General Managers appointed by the local partners. In addition, Beauty – like many of its competitors – had very optimistic assumptions about the market size and found that it had oversized most of its operations. The overinvestment itself, however, was less of a concern in a market that was mostly dominated by increasingly expensive advertising campaigns to establish

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615 The option to postpone of an investment decision to grow the business would have little value if there is little uncertainty due to the little competitive threats and only the demand side to consider.
616 A code name. The case study is based on one interview with a senior executive of this company overseeing the Chinese business operations and closely involved in the development outlined in this text. The information provided during the interview was consistent with publicly available information. It was corroborated and augmented using information gained through numerous press reports, a research report and various internet sources. As the process is mostly based on observable facts and developments that only to a very limited degree subject to interpretation by the interviewee, one interview appears sufficient as the information was triangulated, often multiple times, through alternative sources. However, the final text inevitably reflects to some degree the author’s interpretation of the company’s chronology in China.
the brands as well as a challenging distribution infrastructure. The cost of manufacturing was considered only as a small and necessary share of the overall costs. The company also weights the risk of ‘not being able to ramp up capacity quickly enough’ to be higher than the risk of losing money through overinvestment.

It also soon became apparent that joint venture partners for the most part had divergent interests for the business. Beauty was interested in gaining market share and building a good long-term position, whereas its Chinese partners in the joint ventures were often solely interested in short-term profitability. In the late 1990s, Beauty started to restructure its China operations. It bought out the partners of the almost 20 joint ventures it had created since the mid 1980s or offered a shareholding in a newly created company limited by shares in which all subsidiaries of its largest division in China would eventually be merged (a few other companies were consciously kept separate). As a result of the restructuring effort, some few manufacturing plants were abandoned and one sold. A newly created large scale manufacturing complex (one of its biggest in the world) in a centrally located, but relatively poor province, was also to take over much of the production at the different sites in a bid to gain a better cost position through a low cost work-force and economies of scale. The site was also designed using modular layout to allow easy expansion for further product lines.

Beauty had found that it had expanded to fast and too uncoordinated. Its many partners were creating a costly and complex China organisation. Like other MNCs, Beauty also experienced a lack of appropriately trained and talented managers to run its Chinese operations. Beauty is also said to have spread its resources too thinly, entering too many areas at the same time, while its competition acted more focused by first firmly establishing one product line before moving to the next.

**The Options Perspective**

Beauty oversized its subsidiaries in the beginning with only limited understanding of the market as well as the potential difficulties with its local partners. While the manufacturing itself was (and is) considered to be less important, a more coordinated and structured approach might have helped to allow more time for learning. The consolidation phase can be seen as a response to lower endogenous uncertainty. When the company believes to have enough foresight to concentrate its operations into one large manufacturing complex this led to the exercise of ownership options. The fact that this newly established complex provides space for future expansion at
very little additional cost as well as the taking full control of its operations also underlines a move to create a more flexible China organisation. This new organisation follows a more centralised business model and focuses on exploitation of gained capabilities.

5.3.3 Selected Cases in the Pharmaceuticals Industry

A) The Mechanisms of the Global Pharmaceuticals Industry

The pharmaceutical drug industry can be roughly divided into two main groups: research-based pharmaceutical companies, where R&D cost as well as the marketing of products play the dominant role, and generic drug producers, where R&D is evaded in favour of exploiting the market for drugs where patents have expired. Generic drug producers (low development risk, low margin) are typically substantially smaller than the research-based companies (high development risk, high margin) and compete on price, perceived quality (includes brand strength and actual product quality) and distribution network.

Pharmaceutical companies often serve the market through world-scale plants, which produce drugs at one location for the worldwide market. This kind of set-up is closely related to the ‘global organisation’ model portrayed by Bartlett and Ghoshal (1998: p.52) where “strategic assets, resources, responsibilities, and decisions are centralized” and “[m]anagement treats overseas operations as delivery pipelines to a unified global market”. Typically, prescription and OTC drugs need little adaptation to different countries (except for the package insert in the local language) and are in many cases shipped by airplane due to their low weight, limited shelf life and high margins.

The research-based business is characterised by its high initial R&D cost – where successful products along with the cost of failed research efforts have to be covered by income from products sold – and in some cases complex manufacturing processes. Furthermore, the relatively low cost for raw materials and shipping of products (medicine often weights only a few milligrams per dose) result in very high operating margins.

The average cost for marketing and selling (32%), followed by the cost of goods sold (19%), and research & development cost (15%) are the key components of the cost structure of the largest pharmaceutical companies (median, as percent of sales; see Exhibit 18). According to the executives surveyed, the level of production cost has so far not been a primary differentiation criterion among research-based pharmaceutical products. Furthermore, lower cost is not the main reason for coming
to China. Instead, these companies in many cases need local production in order to gain access to the market.\textsuperscript{617} The decreased shipping costs as well as lower variable costs are seen as not sufficient to outweigh the economies of scale benefits of a single global manufacturing plant for this product.

\textbf{Exhibit 18: The Cost Structure of Large Pharmaceutical Companies}

<table>
<thead>
<tr>
<th>Cost of Goods Sold</th>
<th>Marketing and Selling Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>19%</td>
<td>15%</td>
</tr>
<tr>
<td>32%</td>
<td>4%</td>
</tr>
</tbody>
</table>

\textbf{Notes:} Values represent medians for the 9 of the largest pharmaceutical firms (AstraZeneca, Aventis, Bristol-Myers Squibb, Eli Lilly, GlaxoSmithKline, Merck, Novartis, Pfizer, Roche); Cost of Goods Sold adjusted for Depreciation; Depreciation contains Amortisation expenses where no separate figure published; Standard Deviation for COGS – 6%, R&D – 2%, Marketing and Selling – 4%, and Depreciation 2%

\textbf{Sources:} Company annual reports 2003; own analysis

Most large multinational companies therefore prefer to have factories, each supplying the products they produce worldwide from one location, as adaptation of the products is in most cases not necessary.\textsuperscript{618} Typically, the production facilities are already in place for established products and companies would replicate their infrastructure in China, should they be forced to invest there in exchange for market access rights.\textsuperscript{619}

Some companies produce part of their portfolio in China which is not produced elsewhere (e.g. because it is outdated in the developed countries or cater to specific needs in China) or do enter in alternative businesses areas (e.g. generic products, where manufacturing costs play a much bigger role) that do not constitute the main business in their worldwide sales. A source of concern is the protection of intellectual property rights – not only related to the formulation of drugs but also the related process technology. As a result, many pharmaceutical companies have a rather cautious stance with regard to their investment activity and have often relatively small subsidiaries in the country, which are subsequently expanded if things go well.

\textsuperscript{617} Otherwise products are often restricted through high tariffs, might not be included in the reimbursement list, or have restricted access when buy local policies are in place that treat exports and joint venture products differently (e.g. interview SA73).

\textsuperscript{618} Interview EA36.

\textsuperscript{619} Interviews EC93 (“Do not need many manufacturing plants in China, also import a large portion into China”); EC67 (“need a minimum of 70-80% capacity utilisation to be profitable”).
B) Cure’s Expansion in China

The China operations of Cure\textsuperscript{620} today – like those of many other pharmaceutical companies – are the result of a number of global mergers and acquisitions and therefore more difficult to assess in their development than those of most other companies. Cure, a research-based American pharmaceuticals company, started its first joint venture in the late 1980s producing medicine for the mass market. The company had great expectations for the Chinese market at that time – a ‘dream’ shared by many other global corporations (“1.2 billion potential customers”)\textsuperscript{621} – that led the company to build a manufacturing plant with a large capacity. A second more sophisticated but equally oversized plant followed 4 years later at another location, far removed from the first site. In the rapid roll out of production plants, two further subsidiaries were established – also in new geographic locations, also far away from the existing base, in an effort to cover different regions within China. The expansion followed principles that were often applied by Cure when entering a new country – large investments followed by a big push into the market. However, Cure soon realised that this approach wasn’t working in China and its subsidiaries were not only unable to meet the planned optimistic growth rate, but were even underperforming the market.

In response, the company soon retrenched its China operations. Two subsidiaries were abandoned, and the staff in the central China holding cut dramatically. While Cure was able to stabilise its China operations, the size of subsequent subsidiaries was more carefully scaled (in effect, they had very small initial funding). The company had become very careful and in later investment it preferred an “invest as you go” approach – starting small and expanding subsidiaries not in anticipation but in reaction to demand growth. Excess manufacturing capacity was also diverted by exporting to regional markets in Asia in an effort to improve profitability. The subsidiaries have at all times been very integrated and closely managed by the global headquarters management, leaving them more the role to implement the global products rather to become entrepreneurs for their company. They are managed – as it is often done in large pharmaceutical

\textsuperscript{620} A code name. The case study is based on one interview with a senior executive of this company overseeing the Chinese business operations who was closely involved in the development of the company’s China operations. The information provided during the interview was consistent with publicly available information. It was corroborated and augmented through numerous press reports and internet sources. As the process is mostly based on observable facts and developments that only to a very limited degree subject to interpretation by the interviewee, one interview appears sufficient as the information was triangulated, often multiple times, through alternative sources. However, the final text inevitably reflects to some degree the author’s interpretation of the company’s chronology in China.

\textsuperscript{621} See Studwell, 2002.
companies – through a separate global manufacturing group. New corporate
development initiatives resulting in new subsidiaries would typically come from the
Country Manager in a process that would then involve the Regional Manager and
the Corporate Vice President responsible for the division concerned.

The initial motivation for setting up subsidiaries in China was that
manufacturing facilities were seen as a necessary step for market access. While the
company does not consider this argument as important as it was in the early phase,
now cost efficiency aspects of operations in China have come more to the
foreground. The management has also found that it is important to move fast once
better judgement over the market is attained (lower endogenous uncertainty) and
subsidiaries are going well, otherwise such success as well as potential opportunities
would be quickly eroded by the Chinese competition through learning and copying.
It found that it requires a certain organisational ‘nimbleness’ to be successful. The
company is more willing to experiment in China if the prospects of a project are
highly uncertain. While parts of the company have not shared information across
divisional borders, Cure today is much more looking for ‘success stories’ in order to
learn from their implications.

The Options Perspective
While failing with a ‘big bet’ approach under high uncertainty, the company has
soon learned that it is preferable to start small and expand when uncertainty has
been resolved. The case marks a powerful point, highlighting the superior
organisational posture that an option-based management approach to expansion can
provide. The failure to make the oversized investments work as well as the
restructuring of the company’s China operations towards a more dispersed
subsidiary group reflects a more cautious management style. The organisational
structure that has been created as a result of this process is consistent with an
options-approach.

The emphasis on speed emphasises the trade-off companies often face if they
are not in a position to act fast enough (no fully prepared option to grow in place) to
scale up or down. It also underscores the need for fast cycles of learning and
implementation of the learned, across subsidiaries where applicable. A country-level
coordination of activities can accelerate such learning. This lowers endogenous
uncertainty then provides a favourable environment for the creation and exercise of
capacity options based on the resolution of exogenous uncertainty.
C) Healer’s Expansion in China

Healer,622 a research-based American pharmaceuticals company, started production in China in the early 1990s with a subsidiary that was producing a range of products that had become uncompetitive in developed markets some time ago and other production that had been discontinued. The subsidiary was subsequently expanded while being tightly managed by the global headquarters. It remained the company’s only subsidiary in China.

The company sees no immediate benefit in building additional manufacturing plants in China for products that can easily shipped from a single global manufacturing plant. Instead, the company exports its core product range to China. Healer has always been relatively cautious with its exposure in China. The risks of intellectual property theft, including product formulation and process know-how, were seen as very high in China. It also views its investment size as not of primary importance, rather the company is looking at “what investment is necessary to maximise on opportunities over time”.

The Options Perspective

The company has decided not to expose itself to ‘unnecessary’ capital investment in China. The single subsidiary serves as a platform for expansion as well as an option to learn how to operate. While it is difficult to tell if the company would have benefited from more investment in the early phase, the structure of its operations is consistent with an options-based approach (creating a platform, expansion in response to receding uncertainty).

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622 A code name. The case study is based on one interview with a senior executive of this company overseeing the Chinese business operations who was closely involved in the development of the company’s China operations. The mini information provided during the interview was consistent with publicly available information. It was corroborated and augmented through numerous press reports and internet sources. As the process is mostly based on observable facts and developments that only to a very limited degree subject to interpretation by the interviewee, one interview appears sufficient as the information was triangulated, often multiple times, through alternative sources. However, the final text inevitably reflects to some degree the author’s interpretation of the company’s chronology in China.
5.3.4 Cross-Case Comparison
To understand the nuances in how ideas of the strategic options perspective reflect on the expansion of the six cases of MNCs portrayed above, it is important to contrast them directly.

**Specialty Chemicals industry**
Alchemist and Giant were both relatively early movers in their industry and had similar approaches to investment. Alchemist more forcefully grew its subsidiary portfolio to a large number of subsidiaries, but mainly due to its distinct business portfolio that is less influenced by its base chemicals activities (which tend to focus on large integrated plants). Due to the nature of the business, and perhaps due to influences rooted in the European business culture that the companies have in common, both companies approached their expansion in China with a very long perspective. Probing, Diversifying and Scaling were clearly identifiable phases. Early investment were clearly directed at the reduction of endogenous uncertainty – investing to learn, with a later emphasis on participating in future growth should exogenous factors create new profitable investment opportunities (follow-up investment or new investment with an existing partner). Option structures were common.

**Consumer Goods**
Flash, due to its domain of a restricted industry, took another path. It directly influenced the future shape of the medium-term competitive landscape by investing a large sum. This way Flash reduced uncertainty and could plan with relatively good foresight. Although its markets are hardly comparable, Flash shared the attitude of Beauty that being a leading player in this market is worth almost every expense, and will pay off in the long-term. While Flash had its ‘irreversible’ investment in controlling the country’s foreign-owned manufacturing plants in its sector, Beauty invested similarly high amounts into building brand equity. The option idea is present here in the relationship between uncertainty and investment, although in reverse of the orthodox perspective. Both companies tried to shape and lead the market in order to reduce exogenous uncertainty, which in turn would make their investment in fixed assets more predictable. However, they potentially ignored endogenous uncertainty at their peril.
Pharmaceuticals
Cure and Healer, perhaps due to a differently weighted product portfolio, decided to go opposite routes. Cure invested heavily from the beginning and rushed to set up subsidiaries. The market, however, was too competitive and regulated so that its efforts quickly evaporated. Healer, in contrast, would only invest the minimum to have a toehold in the country. No intention of further expansion was evident and the company concentrated on serving the market through sales offices. Healer appeared to wait for a further opening of the market while weighting its influence to have better access for its exports to China. Cure had tried a ‘big bet’ approach first (high commitment under high uncertainty) and revised its course later to an options-based approach that provided more flexibility and less exposure.

5.4 Boundary Conditions for Strategic Real Options
Boundary conditions are factors that influence the mechanisms of an options approach. Such boundaries towards the application of the options idea could lead to substantial sub-optimality. Two further questions related to Research Question 1 – “What factors influence the creation of strategic real options” that require investigation are: (1) what are the factors that lead companies to adopt an options-based investment strategy, referred to as the perceived boundary conditions; and (2) what factors make such an approach economically unsuitable, referred to as the actual boundary conditions. This investigation primarily addresses capacity options as ownership options more restrained by regulatory restrictions and partner choice (both not subject of this study).

Both sets of factors are shaped by firm, industry and country factors. While the perceived boundary conditions are thought to be shaped more by intrinsic factors (behavioural), the actual boundary conditions are more determined by externalities with their origin in industry-specific and country-specific factors (optimality). They are also strongly related to the three criteria that define real options (irreversibility, uncertainty and managerial discretion).

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5.4.1 Perceived Boundary Conditions

Based on the patterns emerging from the interviews, the propensity of MNCs following an options-based approach is strongly shaped by risk-averseness and experience. None of the surveyed companies has heuristically examined an option-approach, but some still follow its principles intuitively. The perceived boundary conditions are found to be influenced predominantly by three main factors: the sense of uncertainty (both endogenous and exogenous) of future cash flows, the centrality of the production for the business (what proportion of capital is tied to/consumed by the actual production process) and the asymmetries of the resource base.

A) Uncertainty of Undertaking

There are two principal cases regarding exogenous uncertainty. In the first case, there is a low perceived uncertainty for foreign MNCs with regard to future revenues and the required capacity. Still some companies plan ahead and deliberately over-scale their capacity to meet the anticipated demand in a few years time. Depending on the industry, revenue can be more – or less – predictable. Some industries (e.g. energy infrastructure or public transportation) are strongly influenced by government spending, which is often planned for several years in advance (e.g. through a five year plan in some areas in China). In others the demand growth for basic products is related to a number of factors (e.g. general macro-economic growth) that move relatively evenly. This situation can make revenues more predictable if disruptive events (such as the entry of a government sponsored entry or a ‘buy local’ policy) do not occur. The better revenues can be foreseen, the less inclined companies are to follow an option-based approach. This foresight, however, only addresses exogenous uncertainty. Having several options – in the form of subsidiaries – can still be a very useful approach to reduce endogenous uncertainty, which is often also partly a consequence of a formerly unknown joint venture partner (a local partner is typically required in those planned and regulated industries) or location choice. The uncertainty caused by unknown partners at different joint ventures are relatively independent – so that having a portfolio of subsidiaries can be seen as ‘hedging’.

624 E.g. interview EC87.
625 E.g. interviews FC90; EC87.
626 E.g. interview EC44 (a firm in the chemicals industry: “demand is relatively predictable, therefore little market uncertainty”).
627 E.g. companies that find that they have “relatively clear foresight for the next 2-3 years” (Interview EC87).
In the second case, there is high level of perceived uncertainty but companies react by increasing their exposure and trying to influence the market development by brute force. Fast moving consumer goods, a largely unregulated sector of the Chinese economy where market forces of demand and competing products shape the business outlook is characteristic of such behaviour. Early phases are typically characterised by market shapers. The more mature a market becomes, and the less dependent a company is on single products, the better it will be able to forecast revenues and ultimately cash flows. Endogenous uncertainty is a common factor where companies across industries generally agree that it takes time to drive down uncertainty. Such uncertainty is amplified by the opacity and poor information quality.628

B) Centrality of Production

The centrality of production in the business model is found to have a strong influence on the management attention given the potential failure of a subsidiary.629 It is clearly a question of the relative size of manufacturing operations compared to total costs. Many industry executives (e.g. in Consumer Goods and Pharmaceuticals) are more concerned about advertising and R&D than with the cost of manufacturing plants. This is evidently industry-specific and a question of the proportion of capital expenditure for mfg. plants compared to their sales (see Exhibit 19). Structuring this capital expenditure differently might also be a critical point in competitiveness, as local firms in China are noted to have substantially less automation in favour for more employees (providing them more flexibility).630

Executives also clearly perceive a trade-off between risking higher manufacturing cost and risking losing out on market development. Where manufacturing (through depreciation and maintenance capital expenditure) is a smaller portion of the total expense budget, this weighted risk is often seen as of secondary importance compared to the top-line growth (revenue and market share).

As a result, some industries accept inefficiencies in the structuring of their operation (and prefer big bets) in order to ensure to not miss out on opportunities. Businesses in industry sectors that have to manage a high capacity utilisation level in

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628 E.g. interviews EC56 (“market is the main source of uncertainty - amplified by the fact that there is a high level of opacity; resulting in a high level of faulty information”); interview FC41 (“Transparency of the Chinese system is difficult to unravel”).

629 It should also be noted that the capital intensity in China is generally lower as companies tend to employ more workers instead of machines (e.g. for packaging or assembly); e.g. interview FC45.

630 This point also mentioned in many of the interviews conducted for the present study (e.g. FC42). See Chen and Penhirin, 2004: p.70, who found this in the consumer goods industry.
order to be profitable (e.g. chemicals, transportation and engineering) are more sensitive to capital expenditure.\textsuperscript{631}

### Exhibit 19: Cost of Production Facilities in Selected Industries

<table>
<thead>
<tr>
<th>Industry</th>
<th>Depreciation / Net Sales</th>
<th>Fixed Assets / Total Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Products</td>
<td>9%</td>
<td>40%</td>
</tr>
<tr>
<td>Specialty Chemicals</td>
<td>8%</td>
<td>35%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>7%</td>
<td>30%</td>
</tr>
<tr>
<td>Consumer Goods</td>
<td>6%</td>
<td>25%</td>
</tr>
<tr>
<td>Engineering</td>
<td>4%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Notes:** Industry medians comprise Industrial (St. Gobain, Corning, Asahi Glass); Specialty Chemicals (Ciba SC, Clariant, Degussa, DSM, Hercules, ICI, Rhodia, Rohm & Haas); Consumer Goods (Groupe Danone, Eastman Kodak, Henkel, Kao, Nestlé, Procter & Gamble, Unilever); Pharmaceuticals (AstraZeneca, Aventis, Bristol-Myer Squibb, Eli Lilly, GlaxoSmithKline, Merck, Novartis, Pfizer, Roche); and Engineering (ABB, Alstom, Emerson Electric, General Electric, Honeywell, Invensys, Schneider Electric, Siemens).

**Sources:** Company annual reports 2003; own analysis

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### B) Asymmetries in the Resource Base

Large firms, as Wernerfelt and Karnani (1987: p.141) note, are better equipped to wait for the resolution of uncertainty. Sufficient resources often allow firms to ‘leapfrog’ entry barriers as well as to follow multiple directions and remain flexible. The relative size of MNCs was found to be factor that has an influence on how careful managers are in their approach in highly uncertain markets.

Most companies have only limited funds available for international expansion. Smaller firms have to be more careful not to jeopardise their global business through a failure of a large ‘bet’ in an uncertain market. Firms with less ‘slack’ capacity – both financial and on the human resources side – tend to be less inclined to commit substantial resources for exploration and capability building.\textsuperscript{632}

As a result, making ‘big bets’ on markets is also seen as the ‘privilege’ of the large players, as smaller companies often cannot afford to risk a large failure in their foreign operations as it would have a strong impact on their global business. It is also seen as the ‘luxury of losing money’ attributed to large firms that can wait-out high

\textsuperscript{631} E.g. interviews EC87 and EC67.

\textsuperscript{632} See Madhok, 1997: pp.55-56.
Consequently, smaller companies have to take a more cautious, sequential and slower approach.

5.4.2 Actual Boundary Conditions

The empirical investigation found evidence (through the interviews) that the suitability of an options-approach is shaped by three main factors: the regulatory constraints, velocity of the underlying market segment, and scaling step size. These represent the actual boundary conditions, as their status determines where an option-based approach can be employed.

A) Regulatory Constraints

In heavily regulated environments the investment choices are typically limited to few investment opportunities (or even only one). These might even include discrete strategic positions that provide temporary competitive advantage (and as a consequence reduction of uncertainty) that could be more beneficial than the flexibility provided by strategic real options (e.g. in the case of Flash, four years of exclusive access as foreign investor in its market segment). In the early phase of the market opening in China, the government often proposed partners for joint ventures. Here, the minimum investment volume was typically limited by government specifications within a small negotiation range and the MNC could either invest now, or decline and speculate that other, more promising opportunities might emerge in the future.

As regulations were expected to be relaxed over time in China, this presented a gamble: “It is the question: what will be allowed at what time in China?” Can competitive advantage be gained when taking the first opportunity compared to waiting to invest at a later stage and risking to be pre-empted by competitors. Strategic options require managerial discretion about when (timing, speed) and how much (scale) to invest – this is often not the case in highly regulated and controlled markets and as a result the options-based management approach can be seriously constrained.

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634 E.g. interviews EC12, FC42, EC22, SC95, EA49, SC76, and EC68.
635 E.g. interviews EC22 and EC06.
636 Interview EA49.
B) Velocity of the Underlying Market Segment
The higher the velocity of the underlying market segment the more difficult it can be for companies to build the infrastructure fast enough to raise the production capacity to the required level (e.g. market growth of 30% p.a. in the specialty chemicals sector). In financial terms, an option that is deep 'in-the-money' approximates the value of the underlying opportunity. Consequently, where companies are constrained by the speed in which they can add capacity, an options approach does not add significant value to the operation, and waiting too long to exercise might ultimately prove counter-productive for the business. Expansion speed is widely seen as critical for participating in fast growing markets. Acquisitions can be another way of adding platforms in order to then transfer own technology into existing factories.

C) Scalability of Operations
A further factor is the type and scalability of activities prevalent in the spatial market. Strategic options become ineffective where the scaling step size is extremely low (e.g. in assembly plants, where adding a single worker might be the smallest increment). This infringes the irreversibility factor. Where full flexibility exists, and real-time adjustments to demand swings are feasible, real options have no value. As a result, the option value of the subsidiary might rest more on an ownership option – with no capacity option. Other activities – such as specialty chemicals processes – typically require a more pronounced step-up to capital expenditure, for example through the purchase of equipment for a parallel composition process. Here, there can be value in waiting and preserving the option to grow/abandon is much more pronounced.

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637 E.g. interviews EC32 (“can’t hardly over-invest as the markets are growing so fast”); EC87 (country manager of an engineering firm noted that he had “revised the budget five times upwards within one year of one business”); FC42 (“markets turn out to be much bigger than originally anticipated once manufacturing has started”); EC12 (“actual development [high growth] took the industry by surprise”); EC83 (“some markets can grow very quickly; it can happen that the company is not able to raise production quickly enough to satisfy demand from local production”).

638 The time value of the options is reduced as a percent of the total; see Hull, 1997.

639 In some industry, such as for base chemicals, production plants take many years to build.

640 E.g. interview EC99 (noted that only about 1% of the company’s products are locally produced; looking at alternative ways to accelerate investment).

641 E.g. interview SC50 (“almost no scaling steps and continuous resizing possible”; e.g. as in the example of an European electrical equipment company where low value-added assembly is done in China with involves very little machinery. Scale steps here are equivalent to hiring or laying off single employees.

642 Most of the manufacturing companies surveyed have confirmed their possession of highly scalable production operations that would allow such an approach.
Summary
The gap between perceived and actual boundary conditions seems to imply that such mind-sets should be reconsidered. On the other hand, the combination of high velocity and limited scalability might seriously affect the benefit of options and could lead to lost value if a firm would still employ an options approach.

5.5 Discussion
While the case studies largely support the proposed contingency framework, the boundary conditions provide a qualification to the universal application of the option principles. There seem to be some factors that might fundamentally moderate the options logic. These boundary conditions require further detailed examination and have important implications for the strategic options perspective.

The proposed contingency framework makes two important implicit claims that require discussion: (1) that the gap between the Probing and Dispersion phase is not the result of an isolated external incident; and (2) that uncertainty, and not regulatory changes specific to China, has been the key influence for investment behaviour.

When examining the expansion process, it is observable that there is usually a significant gap between the first and the second subsidiary established during which the MNC ‘learned their first lesson’. This kind of gap in these groups is increasingly rare when the ‘big push’ begins. As observable from Exhibit 16, this often coincides with the phase immediately after the ‘Tiananmen Incident’ in 1989, when most companies had temporarily suspended any investment activity in China. This ‘blackout period’ in investment between 1989 and 1992 is clearly a result of the dramatically increased level of uncertainty for foreign firms. It could be argued, that the assumed probing phase was instead caused by this single event and an accelerating market in the late 1980s that led to the creation of many of the first MNC subsidiaries, rather than a systematic pattern. Such exclusive connection – while it certainly had some effect – is unlikely, as there is strong evidence that many MNCs that started in the early and mid 1980s (and reported many opportunities during this time) have had this equal learning phase, in some cases investing in 1989 or even in 1990.

The expansion process was – for many companies – later followed by consolidation of ownership and for some the merging of operations into a more easily managed China organisation. Many of these developments were triggered in response to easing of regulatory constraints that had a thorough impacted on the
level of uncertainty for foreign firms. Here, it also could be argued that the evolution through the three phases is not the result of uncertainty, as proposed, but that of regulation changes. However, in the light of the circumstances this objection is weak, as most firms would have had the chance to invest earlier (e.g. start with a large group from the very beginning) and start with a larger investment scale (‘big bets’). But ultimately those firms considered the downside risk to high. This is also observable in the sharp drop in foreign investment after the Tiananmen incident, where regulation had not changed, but the perception regarding the market uncertainty certainly had. However, regulation certainly influenced uncertainty and provided ‘signals’ that would change behaviour.

It should be noted that only one of the 33 companies surveyed used real options for the evaluation of subsidiaries. Consequently, the implied idealised process outlined in the contingency framework is a result of intuitive adjustment to an uncertain environment by MNCs that happens to be largely consistent with ideas from the real options perspective. Such an approach is characterised by long-term planning considering contingencies. In the best managed of the companies, country organisations are then structured and managed accordingly. Some of the firms characterised their expansion (in hindsight) as two explicit investment phases or ‘waves’ – but these did only emphasize the phases characterised as Diversifying and Scaling and did not recognise the first subsidiary (Probing) as a distinct preparation phase.643

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643 E.g. interview SC50 (“following an isolated business initiative that set up one subsidiary”; “had two big investment waves: (1) to learn, consolidate later; and (2) have a sufficient number of subsidiaries; will mostly grow organically, using existing entities as a base; might grow through select acquisitions”); See also Alchemist and Giant case studies.
6 Theory Testing: Option-Based Management

6.1 Data

6.1.1 Data Sources
The systematic statistical testing of the hypotheses requires detailed and customised data that characterise subsidiaries over time. Four main sources have been used to obtain the necessary data.

Managers who had agreed to be interviewed were asked to provide detailed data on their company’s subsidiaries based on archival information. This company data was augmented with data collected from other sources to derive further critical variables. These sources comprise annual reports (for fixed asset ratios to measure the capital intensity variable, INT), Datastream (for company stock prices to compute volatility in order to derive industry-specific exogenous uncertainty measures, EXU), and Hofstede’s (2001) index for cultural distance data (using the ‘uncertainty avoidance’ measure to derive the variable cultural distance, CCU).

6.1.2 Subsidiary Sample
Detailed data sets for subsidiaries were received from about half (16; 48%) of the companies that have participated in the qualitative inquiry. The data was collected from October 2003 to January 2005 and comprises 105 subsidiaries of MNCs in China that were established between 1982 to 2001.

The MNCs providing subsidiary data were mostly very large and medium-sized companies with median global sales of USD 16.1 billion in 2003. The companies on average provided data on 7 subsidiaries. The industry segments in which these subsidiaries are active were classified as specialty chemicals (31%), industrial products (19%), engineering (18%), consumer goods (16%), and pharmaceuticals.

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644 The data was provided by the interviewees was in most cases send by fax or electronically. It was typically prepared by a delegate and underwent the review of the executive in charge who oversees the country in a Regional/Country CEO or CFO function. All data was critically checked. Where data points were unclear (e.g. missing data or no subsequent investment) it was clarified with the company.

645 The sample size appears sufficient to determine their patterns of expansion. It is comparable to that of other studies looking at subsidiaries are using tailored data requests (surveys; internal archive information) is often in a similar magnitude: Kogut (1991): N=92 or Birkinshaw and Morrison (1995): N=126. Eleven subsidiary data sets were excluded from the sample (trading, service or holding companies) where subsidiaries did not fit the required specifications.

646 Three subsidiaries were established in 2001, but as they started operating in the first part of the year, and the data was provided in early 2005, they were included in the sample as judged to match the specifications of the minimum operating experience criterion set for selection.

647 The number of subsidiaries (as of the year 2000) ranged from 1 to 18. The actual number of subsidiaries is in almost all cases larger, but the sample size was reduced by excluding subsidiaries with a shorter history or with principally activity as trading, service and holding companies.
The global headquarters of the subsidiaries in the data set are for 72% in Europe, for 22% in North America, and for 6% in Asia.

**Potential Areas for Bias**

It was not possible to carry out a systematic check on the accuracy of the obtained data and this may be a source of bias. To increase the reliability of measures, pilot interviews were used to test whether the description of the data points is understandable and whether they are sensible measures from the perspective of former senior managers of China operations.

To test for a respondent bias, the response sample and the sampled population were compared on three criteria: (1) industry classification, (2) country of origin, and (3) median sales. For the comparison for industry classification, the industries in both the sampled population and the response sample were ranked by the number of MNCs represented in each segment. The sampled population and the response sample show similar orders and no significant differences appeared. For the country of origin, the sampled population and the response sample were classified into three regional clusters: Europe, North America and Asia. The comparison revealed a significant under-representation of Japanese firms, and an over-representation of European firms. The comparison of median sales of the companies in the response sample (USD 16.1 billion) to that of the sampled population (USD 17.0 billion) was found to be very similar. Overall, these similarities of the sample characteristics provide sufficient reason to believe that the response sample is somewhat representative of the sampled population.

A survivor bias might arise through undocumented abandoned subsidiaries. Documentation is missing in 3 cases where subsidiaries were sold and remaining records are no longer available. In relation to the overall sample size, this should, however, have only a small effect. In addition, these are not necessarily failed subsidiaries *per se* as some of these subsidiaries were divested as part of a global reorganisation. As essential data points (such as first operating year) could be

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648 The industrial products segment include building material firms.
650 Response sample/sampled population: Asian firms (6% / 20%); European firms (69% / 40%); and firms from North America (25% / 40%); The response profile is not surprising given the European nationality of the researcher.
651 Based on financial year end 2003; the exchange rates as of 31 December 2003 were used for the currency adjustments.
652 This is known for 3 subsidiaries (2 American, 1 European) in the pharmaceutical industry. It is unlikely that there are more, as the received data has been cross-checked with the publicly available information. In this check no further unaccounted entities emerged.
reconstructed it was possible to correct the experience time (input for ENU variable) accordingly for group companies.

Missing data points occurred for some subsidiaries where – particularly for early investments in the 1980s – no records existed for capital injections subsequent to the initial investment.653 One other company reported only scant archival information about the initial relative investment size. Here, the data points for this item were then marked by default as medium-sized by the manager in charge. Consequently, an understated effect can be expected for the relative investment size for the subsidiaries in question.654

6.2 Method of Analysis

6.2.1 Types of Dependent Variables and Econometric Model

1) Polytomous Dependent Variables
The polytomous nature of the dependent variables RIS and TLP (ordinal variables with 5 possible outcomes; essentially partitioned continuous variables) implies that the normal distribution assumption required for an ordinary least-squares regression analysis could be violated.655 Therefore, maximum-likelihood logistic regression is used as the main statistical analysis.

Logistic regression analysis (unlike ordinary least square (OLS) regression) does not assume linearity of relationship between the independent and the dependent variables. Furthermore, it also does not require normally distributed variables, does not assume homoskedasticity, and in general has less stringent requirements.656

The ordered probit regression, which will be used for the following analysis, uses a Maximum-Likelihood estimation (MLE). MLE assumes that the (independent) variables are independent of each other. While part of the logistic regression family,
probit regression assumes a standard normal cumulative distribution function instead of a cumulative distribution function based on a proportional odds model that is used in the logit regression analysis. Such set-up appears appropriate given the nature of the underlying variables. Ultimately, however, there is little difference in probit vs. logit regression as they will return very similar (if not the same) relationships.

The logistic coefficient in a probit regression "indicates by how much the log of the dependent variable’s odds change when the corresponding predictor variable X changes by one unit". The Wald statistic z that is used in logistic regression is a test for statistical significance of individual coefficients and is similar to the Student t-test for coefficients in OLS linear regressions. However, as Menard (1995: p.39) notes, one disadvantage of the Wald statistic is that for large logit coefficients the estimated standard error is inflated – lowering the Wald statistic and resulting in failure to reject the null hypothesis – a Type II error (false negative: assuming that a relationship between two variables is not significant when it is). Therefore, it is important to use a second test where models return large logit coefficients. A log-likelihood test has been performed for such variables where applicable but this did not change the relationships as presented.

Sample size is an equally critical factor that influences the regression parameters. As MLE relies on asymptotic normality it requires a large sample in order to converge (otherwise this would result in high standard errors). While the present sample size is not overly large, no anomalies were apparent.

Pseudo-$R^2$, which does not consider the degrees of freedom of the modelled relationship, is a purely descriptive measure that roughly indicates the proportion of observed variation. Earlier research has found that due to the set-up of its calculation algorithm the ‘explained variance’ ($R^2$) in logistic regression models for dichotomous cases can never exceed 0.36 regardless of how strong the relationship between dependent variable and predictors is.

The situation is similar for ordinal dependent variables where Pseudo-$R^2$ also has a tendency to underestimate model strength. Therefore, Pseudo-$R^2$ is not directly comparable with the same measure for OLS regressions and has to be

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661 The calculation of a ‘real’ $R^2$ is not possible in Maximum-Likelihood regression models; instead a Pseudo- $R^2$ is calculated but it is not entirely comparable as outlined above.
interpreted slightly differently. Refinements exist but there is no consensus on a single measure. As a rule of thumb, logistic regressions with a Pseudo-$R^2$ of more than 10% are generally considered models with high explanatory power.

2) **Dichotomous Variables**
The variables EXC and EXO are both of a dichotomous nature (i.e. two possible outcomes). Similar to polytomous variables, such variables are ideally suited for logistic regression analysis based on MLE routines and the same issues apply as above.

3) **Continuous Variables**
The initial shareholding (SHA) is of a continuous character and restrained to the [0.2,1] interval. This equally suggests a logistic regression analysis, in particular as the distribution of the variables can be expected to be non-normal. For reasons of consistency, continuous variables will also be analysed using ordered probit regression analysis.

6.2.2 **Control Variables**
Where theory or reason suggested that variables other than those contained in the hypothesised relationships might explain variance, control variables were included. These include equity foreign entrant (CFE), investment year (CIY), sales destination (CSD), subsidiary size (CSS), cultural distance (CCU), centralised vs. decentralised business model (CCB), subsidiary group size (CGS), and equity squeeze-out (ESQ).
6.2.3 Descriptive Statistics and Correlations

The descriptive statistics and correlations are illustrated in Exhibit 20. The levels of significance for the pair-wise correlations as shown in the table assume a normal distribution of variables (based on a two-tailed t-test) that is not always the case and is therefore only indicative. All measures used in the model have reasonable variance, suggesting that they are useful for models assessing their correlation. As collinearity effects often result in large standard errors for linear and logistic regression coefficients, they would almost certainly result in regression coefficients that are not statistically significant.\(^{662}\) Potential multicollinearity situations have been closely examined but no critical instances have been found for the independent variables.

A few non-trivial relationships that are significant at a p<0.001 level deserve a brief discussion. There appears to be a strong positive correlation between the initial shareholding and the investment year, which is consistent with the widely reported trend to wholly-owned enterprises in China. The results also show a positive correlation between capital intensity and first entrants. A further interesting result is the strong positive correlation found between cultural distance and a centralised business model. Such relationship is consistent with Bartlett’s (1986) claim that administrative heritage is a key determinant for the organisational structure. The negative correlation between cultural distance and the subsidiary group size could indicate that cultural distance also leads a company to concentrate its investment in fewer subsidiaries or have less presence. A strong positive correlation was found between the subsidiary size and China as a sales destination, which is not surprising as the domestic market grows faster than the export base.

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### Exhibit 20: Descriptive Statistics and Pair-wise Correlations

<table>
<thead>
<tr>
<th>Vars</th>
<th>TLP</th>
<th>RIS</th>
<th>SHA</th>
<th>ECA</th>
<th>EOW</th>
<th>EXU</th>
<th>ENU</th>
<th>INT</th>
<th>ESQ</th>
<th>CFE</th>
<th>CIY</th>
<th>CSD</th>
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</tr>
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† p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Notes: TLP = Time-Lagged Performance; RIS = Relative Investment Size; SHA = Initial Shareholding; ECA = Exercise of Capacity Option; EOW = Exercise of Ownership Option; EXU = Exogenous Uncertainty; ENU = Endogenous Uncertainty; INT = Capital Intensity; ESQ = Equity Squeeze-Out; CFE = First Entrant (dummy); CIY = Investment Year; CSD = Sales Destination; CSS = Subsidiary Size; CCU = Cultural Distance; CCB = Business Structure (dummy); CGS = Subsidiary Group Size; Obs = Observations (number of); S.D. = Standard Deviation

Source: Own analysis
6.3 Results

The results section is organised in the three parts, as defined by the research questions: (1) creation, (2) value, and (3) exercise of options. Two of these parts – the creation and the exercising of options – are characterised by managerial choice and decision-making. The statistical tests performed to analyse the relationships for these parts endeavour to expose the preference of decision-makers for different types of structural responses to uncertainty. In contrast, the examination of the option value follows a different logic. It focuses on the cause-effect relationship between the structuring of investments along option principles, and performance, a proxy for value.

The statistical test controlled for a number of further factors beyond those reported in the models, which could have theoretically influenced the analysis. These include testing for regional and country specific bias. Furthermore, the fact that the subsidiaries belong to a smaller number of MNC parent companies and might therefore share a bias in one or more variable was tested through dummy variables. None of these factors has been found to be statistically significant, coefficients were generally very low and the results are therefore presented in summarised form.

6.3.1 Creation of Options

To estimate the impact of the independent variables on the relative investment size, an ordered probit regression analysis was performed. The significance of the theoretical model was tested by examining whether the addition of independent variables significantly improves the ability to explain the variation in relative investment size. A log-likelihood test was used to compare the nested restricted model (where one independent variable has been removed) with the full model including the control variable. This yielded essentially the same result. The model Pseudo-$R^2$, around 0.10 for model 1 and model 2, is adequate and relatively high given the nature of the data as well as the low ceiling of maximum explained variance for logistic regression analysis (see Section 6.2.1). The model $\chi^2$-test resulted in a probability of $p<0.005$ that all coefficients in the model equal zero.
Hypothesis Testing

The model estimates are reported in Exhibit 21. Hypothesis 1a suggests that endogenous uncertainty (ENU) leads to a more pronounced option character, i.e. smaller relative investment size (RIS). Hypothesis 1b states the same relationship for the exogenous uncertainty (EXU). The results show coefficients that are consistent with the hypothesised direction of the effect, but the level of significance is too low to support the hypotheses. Consequently, the null hypotheses for these two relationships (i.e. no influence of uncertainty) cannot be rejected.

A negative sign means that that the variable increases the likelihood of smaller relative investment size.
As predicted by Hypothesis 1c, the results show a strong negative relationship between the capital intensity (INT) and the relative investment size (RIS). The higher the capital intensity of the MNC, the lower – on average – the relative investment size of the subsidiaries. The relationship is found to be highly significant (p=0.005; z=-2.8) and the hypothesis is supported. Based on this evidence it can be concluded that decision-makers appear to be strongly influenced in their choice of relative investment size by the capital intensity of their business, but do not necessarily adjust investment levels to the prevailing uncertainty.

Control Variables
The initial shareholding is found to be significantly positively correlated (p=0.003; z=3.0) with the relative investment size. This could be interpreted in two ways: first, that firms commit less capital to joint undertakings compared to situations where they have full control, or second, as a measurement issue if firms have systematically assessed the relative investment size on the basis of their shareholding, rather than on the total capital employed in the subsidiary. The fact that capital intensity seems to have a similarly strong but positive effect on the initial shareholding (in model 2), might suggest that MNCs are indeed more cautious (a conservative attitude that is exemplified in both the amount of capital they commit as well as the control they exert) the higher their capital intensity.664

B) Creation of Ownership Options

Hypothesis testing
It is hypothesised that high endogenous uncertainty (Hypothesis 1d) and high exogenous uncertainty (Hypothesis 1e) have negative effects on the initial shareholding (SHA). Analogous to relative investment size for capacity options, low initial shareholding is seen as a characteristic of ownership options. The results of the statistical test (reported in model 2 in Exhibit 21) do not provide evidence that would support such a relationship and therefore the null hypotheses cannot be rejected.

The findings could imply that the ownership levels were derived more from practical considerations – based on applicable regulations for foreign ownership or

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664 Potential industry effects were tested with an extended model but found no statistical significance other than a weakly negative influence of engineering firms. Such relationship is hardly surprising as engineering firms correlate strongly with the capital intensity measure. It can therefore be disregarded. Another variable that could only be relevant for the creation of options, the size of the parent company (measured as sales in USD) was included as a further control variable but had no effect and was not statistically significant. As the extended model yielded no additional insights, the results the models are shown in summarised form.
corporate investment policies that discourage non-control shareholdings, which could not be observed and measured.

**Control Variables**

Beyond the hypothesised relationships, five further variables were found to have statistically significant coefficients. The capital intensity is found to have a strong positive and statistically significant effect ($p=0.003; z=3.0$) on the average initial shareholding. Companies with high capital intensity will often derive more of their value from proprietary production technology. It appears likely that companies with high capital intensity will therefore avoid sharing control over subsidiaries to protect their knowledge. Unsurprisingly, the investment year (CIY) also has a (weak) positive influence on the level of initial shareholding (with high statistical significance: $p=0.003; z=2.9$) as regulations on foreign ownership were relaxed over time, which allowed MNCs to set up wholly-owned subsidiaries. Such a phenomenon is also consistent with the idea that ownership options have their greatest value under both high endogenous and high exogenous uncertainty, which are assumed to be decreasing over time. Cultural distance (CCU) was found to have a very weak but statistically significant ($p=0.007; z=-2.7$) negative relationship with SHA.\footnote{This might appear on the one hand a bit surprising, that companies that have a larger cultural gap to bridge seem to be more inclined to enter joint ventures. On the other hand, these companies were likely investing less than peers with closer cultural ties - lowering their risk. In the end, it is only a very small effect that has been measured.} This relationship was proposed in a similar way by Li, Lam and Qian (2001: p.120), but the authors of that study could not find empirical evidence to support this relationship.\footnote{See Li, Lam and Qian (2001: p.120) Hypothesis 4: “JVs in China which are funded by firms from similar East Asian cultures have a higher percentage of foreign partner ownership than those funded by partners from Western individualistic cultures”} The business model (CCB; centralised/decentralised) exhibits a positive effect (significant at a $p=0.016$ level; $z=2.4$), on the initial shareholding. This relationship was expected, as the more companies follow a centralised business model, the more they are typically trying to control subsidiary activities (i.e. through control of the shareholding). Analogous to the results of model 1, RIS is found to have a significant positive effect ($p=0.001; z=3.3$) on the initial shareholding.\footnote{To test for potential industry effects, an extended model (not reported here) was tested but found no statistical significance for any industry.}
6.3.2 Value of Options

It is hypothesised that the use of options should – in the medium and long run – be associated with superior financial performance and value. To capture this effect, the time-lagged financial performance (TLP; 5 to 7 years after start of operations) compared to the company’s cost of capital was measured\(^{668}\) using a 5-point Likert-scale. The relationship was – as before – tested using an ordered probit regression analysis based on Maximum-Likelihood estimation. The results are shown in Exhibit 22. The model \(\chi^2\)-test resulted in a probability of \(p=0.05\) that all coefficients in models 3 and 6 equal zero (models 4 and 5 are statistically not significant and therefore will not be considered). The lower model Pseudo-\(R^2\) of 0.05 was expected and seen as adequate given the nature of the data, the low ceiling of maximum explained variance commonly experienced in logistic regression analysis, and the many factors that influence company performance.

A) Value of Capacity Options

Hypothesis testing

Hypothesis 2a predicts that subsidiaries with small initial investment size when endogenous uncertainty (ENU) is high results in superior time-lagged financial performance. Hypothesis 2b suggests the same relationship for exogenous uncertainty (EXU).\(^{669}\)

The models 3 to 6 investigate these two hypotheses. Four effects were tested: (1) the effect of subsidiaries with an capacity option structure that were started when endogenous uncertainty (ENU) was high in model 3; (2) the effect of subsidiaries with an capacity option structure that were started when exogenous uncertainty (EXU) was high in model 4; (3) the effect of subsidiaries with an capacity option structure that were started when endogenous uncertainty and exogenous uncertainty were both high in model 5; and (4) the effect of capacity options under high endogenous uncertainty and capacity options under high exogenous uncertainty are analysed in combination in model 6.

\(^{668}\) Based on the judgement call of the senior executive providing this data (on the basis of archival data). Due to collinearity issues between option structures and industry sectors, the industry sectors could not be controlled directly. Instead, the TLP variable was normalised using the arithmetic average of TLP per industry.

\(^{669}\) Capacity options are defined to be present if uncertainty is high (ENU / EXU > 0) and relative investment size is small (RIS<0). They are compared against all other combinations (Commitment, Big Bet, and Orphan investments; see Section 3.4.1 for definition).
The results in models 3 and 6 show positive and statistically significant (p=0.005; z=2.8) coefficients for capacity options under high endogenous uncertainty. These results support Hypothesis 2a, where a small investment under high endogenous uncertainty (ENU) was expected to have a positive influence on the subsidiary value. This finding implies that starting small when endogenous uncertainty is high has positive implications for the value of the options. For exogenous uncertainty (EXU), models 4 and 5 are not found to be significant and capacity options do not appear to have a positive influence on the subsidiary value.

### Exhibit 22: Value of Capacity Options – Ordered Probit Regression

<table>
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<tr>
<th>Independent Variables</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
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<td>(0.35)</td>
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<td>(0.11)</td>
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**Note:** N=105; *** p<0.001; ** p<0.01; * p<0.05; † p<0.10; Coefficients are logistic; standard errors in parentheses; TLP normalised for industry effects; due to the nature of the Maximum-Likelihood estimation ENU and EXU could not be added as additional variables (high correlation with variable combinations).
have any effect on TLP. This might, however, also be a result of measurement issues.\textsuperscript{670}

Exhibit 23: Value Effect of Capacity Options by Industry

<table>
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<tr>
<td></td>
<td>No Option</td>
<td>Option</td>
<td>Effect</td>
</tr>
<tr>
<td>CG</td>
<td>-0.9</td>
<td>2.0</td>
<td>+++</td>
</tr>
<tr>
<td>EN</td>
<td>1.4</td>
<td>0.8</td>
<td>-</td>
</tr>
<tr>
<td>PH</td>
<td>0.4</td>
<td>1.3</td>
<td>+</td>
</tr>
<tr>
<td>SC</td>
<td>0.3</td>
<td>0.3</td>
<td>O</td>
</tr>
<tr>
<td>IP</td>
<td>0.3</td>
<td>1.3</td>
<td>+</td>
</tr>
</tbody>
</table>

\textit{Note: Values represent time-lagged performance (TLP); compares arithmetic averages of an option-based approach (high uncertainty; EXU / ENU > 0, low investment; RIS < 0) with other approaches (Big Bet, Commitment, and Orphan investments; `+++`/`-` = difference more than 1.5 times the standard deviation; `++`/`-` = difference more than the standard deviation; `+/-` = difference more than 0.5 times standard deviation; `O` = about equal.}

A more detailed analysis\textsuperscript{671} was then performed to investigate whether a capacity option structure would be beneficial in all the industry sectors represented in the sample. The results in Exhibit 23 indicate that an options-approach under endogenous uncertainty (for which the model indicated statistical significance) has a neutral to slightly positive effect on the value (measured by time-lagged performance; TLP) for the specialty chemicals (SC) firms, positive effects for pharmaceuticals (PH) and industrial products (IP) in the sample, and strong positive effects for consumer goods firms (CG). The findings below seem to suggest that such approach might even be counter-productive for companies in the engineering sector, perhaps due to the fact that small investment constrain the speed of adjustment to a fast growing market or more transferable experiential knowledge from other regulated market provides engineering firms with lower uncertainty.\textsuperscript{672}

\textsuperscript{670} Exogenous uncertainty is difficult to measure and no established procedure exists. While many authors have used volatility measures before, the choice as well as the applicability are always subject to judgement and only allow a certain degree of approximation. While a number of different measures for uncertainty have been tested, there might well be better ones that support this predicted relationship statistically.

\textsuperscript{671} This, in fact, represents a variation of the non-parametric box-plot. As a ranking and quartiles are not applicable when using ordinal variables, the standard deviation is seen as an adequate measure for comparison.

\textsuperscript{672} In the case of better experiential knowledge the ENU definition would not be a suitable measure.
Control Variables

Three control variables were found to have an effect on TLP. As expected, the size of the subsidiary (CSS) is significantly and positively correlated ($p=0.08; z=1.7$) with the subsidiary value (measured by TLP). Cultural distance was found to be statistically significant ($p=0.067; z=-1.8$), but with a coefficient close to zero and can therefore be disregarded. Sales destination (CSD) was found to have a strong negative effect that is also found to be statistically significant ($p=0.056; z=-1.9$). This result is consistent with an earlier conjecture that market-seeking firms are exposed to more uncertainty. Other control variables showed no significant coefficients. However, a notable result is that first (foreign) entrants were not found to be significantly associated with higher value and superior performance, contrasting findings by Isobe, Makino, and Montgomery (2000: p.478).

There is also no significant relationship between relative investment size in isolation (regardless of uncertainty) and subsidiary value. The results support the earlier argument for the need of uncertainty as a moderating variable – a qualification that is missing in the related ‘Proposition 3’ that was formulated by Bowman and Hurry (1993).

B) Value of Ownership Options

Hypothesis testing

Hypothesis 2c states that ownership options (characterised by an initial shareholding of less than 75%) under high exogenous uncertainty have positive implications for the subsidiary value. Analogously, Hypothesis 2d predicts that ownership options under high endogenous uncertainty have positive value. All models related to ownership options were not statistically significant. Consequently, the suggested combination of ownership options and uncertainty (exogenous and endogenous) could not be empirically substantiated and was not found to be statistically significant (see Exhibit 24). On the basis of these results, the null hypotheses for 2c and 2d cannot be rejected.

673 Of the 105 subsidiaries, 43% were classified to be first foreign entrants in their business. This relatively high level might be explained by how narrowly companies define their business.

674 Isobe, Makino and Lieberman (2000) have made a further argument, supplemented by empirical support, with regard to the initial resource commitment (technology and expatriates) of the subsidiary that would lead to superior economic performance. However, the authors did not measure investment size. Their empirical investigation comprised a sample of Japanese firms entering China.

675 Bowman and Hurry’s (1993: p.768) Proposition 3 reads as follows: “Organizations that enter new businesses and markets by linking investments – so that small options are followed by larger strikes – will perform better than those entering with only discrete small, or large, investments.”
### Exhibit 24: Value of Ownership Options – Ordered Probit Regression

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Model 7</th>
<th>Model 8</th>
<th>Model 9</th>
<th>Model 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TLP</td>
<td>TLP</td>
<td>TLP</td>
<td>TLP</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENU * Ownership Option</td>
<td>0.01</td>
<td></td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>(0.22)</td>
<td></td>
<td></td>
<td>(0.23)</td>
<td></td>
</tr>
<tr>
<td>EXU * Ownership Option</td>
<td>0.18</td>
<td></td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>(0.21)</td>
<td></td>
<td></td>
<td>(0.22)</td>
<td></td>
</tr>
<tr>
<td>ENU * EXU * Ownership Option</td>
<td></td>
<td>0.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.27)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Shareholding (SHA)</td>
<td>-0.29</td>
<td>-0.26</td>
<td>-0.40</td>
<td>-0.29</td>
</tr>
<tr>
<td>(0.55)</td>
<td>(0.53)</td>
<td>(0.53)</td>
<td>(0.55)</td>
<td></td>
</tr>
<tr>
<td>Capital Intensity (INT)</td>
<td>0.85</td>
<td>0.75</td>
<td>0.79</td>
<td>0.73</td>
</tr>
<tr>
<td>(1.11)</td>
<td>(1.11)</td>
<td>(1.11)</td>
<td>(1.12)</td>
<td></td>
</tr>
<tr>
<td>First Entrant (CFE)</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>(0.24)</td>
<td>(0.24)</td>
<td>(0.24)</td>
<td>(0.24)</td>
<td></td>
</tr>
<tr>
<td>Investment Year (CIY)</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>(0.05)</td>
<td>(0.05)</td>
<td>(0.05)</td>
<td>(0.05)</td>
<td></td>
</tr>
<tr>
<td>Sales Destination (CSD)</td>
<td>-0.61</td>
<td>-0.54</td>
<td>-0.44</td>
<td>-0.53</td>
</tr>
<tr>
<td>(0.36)</td>
<td>(0.37)</td>
<td>(0.38)</td>
<td>(0.37)</td>
<td></td>
</tr>
<tr>
<td>Cultural Distance (CCU)</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td></td>
</tr>
<tr>
<td>Business Structure (CCB)</td>
<td>0.21</td>
<td>0.19</td>
<td>0.14</td>
<td>0.18</td>
</tr>
<tr>
<td>(0.28)</td>
<td>(0.28)</td>
<td>(0.28)</td>
<td>(0.28)</td>
<td></td>
</tr>
<tr>
<td>Subsidiary Group Size (CGS)</td>
<td>-0.05</td>
<td>-0.05</td>
<td>-0.05</td>
<td>-0.05</td>
</tr>
<tr>
<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.04)</td>
<td></td>
</tr>
<tr>
<td>Subsidiary Size (CSS)</td>
<td>0.17 †</td>
<td>0.15 †</td>
<td>0.12 †</td>
<td>0.15</td>
</tr>
<tr>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-171.1</td>
<td>-170.7</td>
<td>-170.0</td>
<td>-170.7</td>
</tr>
<tr>
<td>Model $\chi^2$</td>
<td>9.5</td>
<td>10.2</td>
<td>11.6</td>
<td>10.2</td>
</tr>
<tr>
<td>df</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Prob &gt; $\chi^2$</td>
<td>0.468</td>
<td>0.427</td>
<td>0.315</td>
<td>0.513</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.027</td>
<td>0.029</td>
<td>0.033</td>
<td>0.029</td>
</tr>
</tbody>
</table>

**Note:** N=105; *** p<0.001; ** p<0.01; * p<0.05; † p<0.10; Coefficients are logistic; standard errors in parentheses; TLP normalised for industry effects; due to the nature of the Maximum-Likelihood estimation ENU and EXU could not be added as additional variables (high correlation with variable combinations)

### Control Variables

To assess effects specific to industries, a detailed analysis of ownership options was undertaken that is summarised in *Exhibit 25*. The results appear – consistent with the results of models 13 to 16 – somewhat inconclusive. In particular for endogenous uncertainty there seems to be a generally neutral effect apart from a relatively strong sign for consumer goods companies, which appear to benefit most from employing an options approach under both high endogenous and high exogenous uncertainty.
### 6.3.3 Exercise of Options

In 59% of the subsidiaries, capacity growth options were exercised with an expansion volume that was on average (median) 100% of the initial investment size. A further 6% of the options (subsidiaries) were reportedly abandoned. The remainder, 35% of the original capacity options, remained unexercised.

The exercise of options can be seen as a reaction to a changing perception of the environment. For capacity options this usually means that opportunities with positive net present value appear, which have not been clearly visible at the time of the initial investment. Exogenous uncertainty, which is resolved over time, could lead to the exercise of the option.

The exercise of ownership options can be a result of new capabilities created through the operating experience or new information gained about the environment. As wholly owned subsidiaries have been excluded from the ownership option sample (as there is no ownership option to grow), the sample size was reduced to the 70 subsidiaries that started as joint ventures.

The dependent variables for both ownership and capacity options are dichotomous variables (exercise yes or no; coded 1 and 0). An ordered probit regression analysis was performed to examine the relationships. The results in Exhibit 26 show two sets of models: the exercise of capacity options is tested in the models 11 and 12; and the exercise of ownership options tested in the models 13 and 14.

#### A) Exercise of Capacity Options

The model $\chi^2$-test for model 11 resulted in a probability of $p<0.01$ that all coefficients in the model equal zero; the $\chi^2$-test for model 12 was somewhat lower (at $p=0.03$).
The model Pseudo-R² of 0.20 and 0.23 is in both models very high, indicating an excellent fit.

**Hypothesis testing**

The results for the capacity options are presented in models 11 and 12. *Hypothesis 3a* states that receding exogenous uncertainty would lead companies to exercise their growth options and add capacity. Exercise of capacity growth options (ECA) has been defined as a subsequent investment that adds more than 50% of additional capital within the first 5 years. The results show no statistically significant relationship between decreasing exogenous uncertainty and TLP, and the null hypothesis for *Hypothesis 3a* cannot be rejected.

*Hypothesis 3b* predicts that receding endogenous uncertainty would lead to an exercise of capacity options. Here, the hypothesised negative relationship was found to have a very high coefficient that was statistically significant (p=0.009; z=-2.6 and p=0.019; z=-2.4, respectively) in both models (11 and 12). The *Hypothesis 3b* is therefore supported. It is important to note that the exercise is measured within the first 5 years of subsidiary existence, so that experience in isolation is the same for all subsidiaries (positive correlation of time and exercise would be trivial). Instead, the results indicate that endogenous uncertainty, based on the experience of the country group, is responsible for the exercising of subsidiary options.

*Hypothesis 3c* states that financial performance (a proxy for option value) would have a positive influence on the exercise of capacity options. The results show no statistically significant effect for financial performance and, as a result, the null hypothesis cannot be rejected. However, a variation of the hypothesised relationship, the quadratic term TLP² (emphasizing very high or very low performance), was found have a small positive and statistically significant (p=0.041; z=2.1) effect on the exercise of capacity options. The exercise of growth options in low performance situations could indicate turnaround efforts, where additional investments are made to reach a critical mass as well as buying out the partner at the same time. This explanation is supported by evidence that the equity-squeeze-out (ESQ) was also found to have a very strong and statistically significant effect (p=0.033; z=2.1). This relationship can be interpreted that MNCs are buying out their partners in conjunction with the exercising of capacity options (partners who can’t match the capital injection would be diluted in their shareholding).
Control Variables

Companies characterised as first (foreign) entrants (CFE) in China are found to be more inclined to ramp up investment quickly. The results exhibit a weak, statistically significant effect (p=0.09; z=1.7 in model 11). Such behaviour is by no means surprising as first movers would probably also continue to take more risks and invest aggressively. The sales destination (CSD), as proxy for the exposure to the local market uncertainty is also found to have a relatively strong, moderately statistically significant (p=0.049; z=2.0) effect on the exercise of capacity options. This could mean that subsidiaries that are more focused on the local market (compared to others...
which have a greater emphasis on exporting) stage their investment more actively. Furthermore, cultural distance (CCU) is found to be weakly statistically significant (p=0.065; z=1.8) although with an effect close to zero.676

B) Exercise of Ownership Options

The model $\chi^2$-test (models 13 and 14) resulted in probabilities of $p=0.42$ and 0.72, respectively, that all coefficients in the model equal zero. One reason for these inconclusive results could be the reduced sample size through the smaller number of subsidiaries where a buy-out of the partner and exercise of the option occurred.

The exercise of ownership option (EOW) is defined as the buyout of a partner (ESQ>0) from a level below the control threshold (here defined as 75%) to a level above the control threshold (resulting in 20 exercised options). Variations of the definition of the exercise variable – alternatively as the buy-out to full ownership (the 100%-level; resulting in 11 exercised options) and the 90%-level ownership post exercise (resulting in 14 exercised options) – essentially yielded the same result. Other variations below the 75%-level did not seem to be useful as most of the joint ventures have only an average initial shareholding (SHA) of 67%, which was then increased subsequently to an average of 74% after 5 years. Smaller incremental ownership changes do not, in general, constitute the exercise of options (as they allow relatively costless reversal; violating the irreversibility characteristic of a real option).

The fact that 21% of the 70 subsidiaries exercised their ownership options could be interpreted as support of the value of such structures – but only if other reasons such as turnaround efforts or considerations of damage done by abandonment could be ruled out with certainty. The comments provided by the MNCs for the subsidiaries where an ownership options were exercised include the need to take “control” (often related to difficulties with the partner) and remarks that subsidiaries had been abandoned after the increase in ownership. Consequently, buy-out is not necessarily a sign of value for ownership options.

The modelled relationship of uncertainty and performance on the exercise of options (defined as dichotomous variable that indicates the buy-out of a partner) could not be validated. Consequently, the Hypotheses 3 c, d and e were not supported, and the null hypotheses cannot be rejected.

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676 A tabulation by industry sector was found to provide no additional meaningful insights and the model is therefore presented in summarised form.
6.4 Discussion

6.4.1 Capacity Options
Capacity options are seen as the core component of an option-based strategy in foreign expansion. The creation of capacity options appears to be primarily shaped by the capital intensity of the company (Hypothesis 1c). It is somewhat surprising that neither endogenous (Hypothesis 1a) nor exogenous uncertainty (Hypothesis 1b) appear to have an effect on the structuring of investments.

The investigation of the value of options indicates that there is a strong positive effect for subsidiaries structured as capacity option (small initial investment) under high endogenous uncertainty (Hypothesis 2a). This finding, while in itself intuitive, is contrary to many arguments made in the literature surrounding the first mover advantage (which in itself is found to have no effect) on the value and the proponents of Big Bets as a strategy for market entry. However, empirical evidence for a Big Bet strategy to be generically valuable for entry and expansion into a foreign market has always been thin. The statistical analysis of capacity options supports the notion that being first is good (or at least not negative) – but more importantly, the findings imply, investment under high uncertainty should in general be small in size.

It could be argued that the value of capacity options under endogenous uncertainty is due to the passage of time and the general market growth rather than an ‘option effect’. Conceptually, this objection is weak, for the model is controlled by the investment year and this would not explain the ‘over-performance’ of subsidiaries that have started small when the MNC was relatively new in the market and faced by endogenous uncertainty that needed to be reduced. The effect therefore has to be idiosyncratic to the MNC.

The investigation also revealed that it is important to closely examine specific industries in isolation. The results indicate that engineering companies might not benefit from an option-based approach. Conceivably, this might be influenced by a generally lower level of endogenous uncertainty specific to the engineering businesses, which are used to dealing with governments in emerging markets. Contrary to Hypothesis 2b, exogenous uncertainty was found to have no effect on the value of capacity options.

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677 See, for example, Isobe et al., 2000 (who in their discussion equated “the degree of resource commitment to technology transfer” (p.474) to the overall commitment to the market; from a capital investment perspective, however, this has not to be the case); Lieberman and Montgomery, 1988.

678 See, for example, Hout et al., 1982.

679 This might also be applicable for firms in other industries that share critical characteristics related to the boundary conditions.
The results show that the exercise of capacity options is primarily a reaction to receding endogenous uncertainty (*Hypothesis 3b*). Neither the change in exogenous uncertainty (*Hypothesis 3a*) nor high performance (*Hypothesis 3c*) was found to have an effect on the propensity of companies to exercise capacity options. However, very positive or very negative financial performance of the subsidiary was found to have a small effect on likelihood of exercise. While increasing the investment in an underperforming subsidiary is perhaps not immediately intuitive (‘throwing good money after bad’), it seems that companies see a value benefit in such investments – either directly in the subsidiary or as a necessary step from a group perspective.

Due to the set-up of the empirical investigation, this study has been somewhat biased towards finding the appropriate structures for highly uncertain environments, looking perhaps a bit more at the downside than on the upside. Structurally, however, it is difficult to consider upside opportunities in isolation and recognise them before the exercise. This is, as it was argued earlier, due to the fact that in essence all subsidiaries contain capacity call options. It is only that, compared to the lower cost of smaller options, these tend to be superior for highly uncertain environments, have a clearer structure and are therefore better measurable. The evidence for the chain of hypotheses from the creation, to the value, to the exercise of options supports the argument that endogenous uncertainty has a strong influence on all components of capacity options. This connection provides strong empirical support that an options-based strategy is indeed a way to maximise the value of foreign operations for companies in most manufacturing industries (and potentially also in the service sector).

### 6.4.2 Ownership Options

This study is – to the best knowledge of the author – the first to investigate the value benefit of ownership options for subsidiaries. All prior studies have assumed that such structure would have value without undertaking a direct empirical examination that would support this assumption. Like Kogut’s (1991) influential study, empirical investigations of ownership options predominantly focused on the exercise of ownership options (*e.g.* acquisition/dissolution in the case of Kogut, 1991: p.31) and implicitly assume that such action must have value to the ‘option holder’ (“management decisions are cued by market signals that the venture value has increased” in the case of Kogut, 1991: p.30).

There is little support from this empirical investigation for the case of ownership options. While there were a number of non-hypothesised effects on the
ownership of subsidiaries, neither the central value hypotheses nor any predicted relationship with regard to the creation or exercise of ownership options was supported. The fact that there appears to be no direct value benefit from ownership options (measured as superior performance) might indicate that partners do not contribute significantly to the joint venture.\textsuperscript{680}

The fact that buy-out terms are commonly not fixed in advance and that transaction costs are often high (e.g. through a necessary bid-premium for a buy-out or price discount for a forced sale) add to the inconclusive results and bring into question the widely cited proposition by Kogut (1991) of the value of ownership options.\textsuperscript{681} While there might be certain environments (e.g. research and development joint ventures in developed markets) where the ‘sharing of uncertainty’ provides more value to the holders, this is – perhaps – less the case in a foreign entry situation. But it might also be, as Bowman and Moskowitz (2001: p.776) speculate that such ownership options have no value (i.e. the amount for which the buyout takes place) if the option is not fixed in advance.\textsuperscript{682} A transaction at fair market value at the time of the buyout leaves no benefit for the option holder (unless there are substantial value benefits that are not shared by the other party).\textsuperscript{683}

The present findings might suggest that ownership options with contractual exercise price might be a commendable but marginal structure in international joint ventures. While the idea of ownership options in foreign expansion cannot be seen as refuted, the fact that there is no indication for value should lead researchers to critically investigate the circumstances under which ownership options are expected.

\textsuperscript{680} This could also be related to the fact that a number of joint venture ‘ownership options’ have been enforced through regulation – affecting the value. However, it also cannot be ruled out that the time-lagged performance proxy for value is not ideal to capture the value of ownership options.

\textsuperscript{681} Kogut (1991) has, in fact, never examined if such a structure is ultimately valuable to its holder (instead looking at the exercise of the option under different structural environment. His argument is based on the assumption that there is value and real options were portrayed as the explanation.)

\textsuperscript{682} A contractual right for a buy-out at a pre-determined fixed price appears somewhat hypothetical as all rational parties would favour a variable pricing formula, e.g. based on a pre-determined earnings multiple such as enterprise value-to-EBITDA (earnings before interest taxes depreciation and amortisation).

\textsuperscript{683} See Bowman and Moskowitz, 2001: p.776.
7 Synthesis: Integrated Strategic Options Management

The analysis of expansion patterns of the 41 multinationals studied\(^{684}\) has highlighted a number of important insights about the application of option strategies in the international management context. The following sections will outline the implications of the findings for managerial decision-making and organisational structure. These are based on the analytical findings of the previous chapters, augmented by what managers consider ‘best practice’ in China. This chapter is divided into three parts highlighting: (1) organisational components that support an options-based management approach under high uncertainty; (2) the option-cycle, a corporate development process for foreign expansion under uncertainty; and (3) a summary of implications for managerial practice.

7.1 Components of an Option-Based Approach

An option-based management approach as laid out in this study suggests that firms should adapt investment size (assuming there is an attractive opportunity to invest) to the degree of exogenous and endogenous uncertainty. Such an approach also incorporates organisational characteristics and institutionalised processes that address the factors that define real options: uncertainty, irreversibility and managerial discretion.

7.1.1 Uncertainty: Analytical Assessment and Management

Uncertainty, as the prior chapters have shown, is one of the principal forces to shape the structural optimality of investment. Assessing and managing this uncertainty is therefore paramount to avoid idiosyncratic economic losses (e.g. through write-downs or excess depreciation on over-investments).

1) Uncertainty Assessment

A systematic analysis of uncertainty and its potential effects is surprisingly rare in the strategic planning of foreign entry and expansion. Many managers are so absorbed by operating issues that they spend little time considering explicit sources of uncertainty that provide opportunities or challenges for the company in the medium- to long-term. The main reason for this lack of awareness is that most MNCs do not employ analytical tools to assess and monitoring such factors. The framework presented by Miller (1992) provides systematic categories that allow the tracking and

\(^{684}\) Interviews have been conducted with 33 firms, 8 others were studied based entirely on archival information.
assessment of several types of uncertainties (see Exhibit 6 in Section 2.3.1) could help to support such process.

An ‘uncertainty landscape’ created on the basis of such assessment could be used to integrate such analysis on a subsidiary, business group and country group basis. Such a systematic framework that details the company specific uncertainty factors and holistically monitors the environment can help to consider ‘unthinkables’, events that are unlikely but could dramatically change the business for good or bad. The company should be in a position to develop organisational responses to these factors (e.g. through capacity expansion or accelerated temporary shut-down) and implement low cost flexibility-enhancing measures (e.g. spare land). This could help companies to become faster in their responses to changes in their environment. It requires a well-informed planning function that monitors not only the company’s own industry but also experiences from companies in different industries.

2) Managing Endogenous Uncertainty

The ability to learn fast and to distribute the gained knowledge throughout the organisation are important capabilities for an effective foreign expansion. Firms that develop the most effective capabilities in acquiring and dispersing such knowledge within their group will be most resource efficient. The lower the endogenous uncertainty with regard to the operating environment, the clearer are prospective opportunities that can be explored by developing growth options. The transfer of local market knowledge, which is predominantly of tacit nature, between entities and its diffusion within the subsidiary group, however, is difficult. Firms therefore require processes and institutionalised systems to manage critical knowledge.

Few of the MNCs surveyed, however, claim that they would consider themselves to be effectively organised in a way that would encourage the sharing of information. Most firms conceded that there is a great potential for improvement with regard to this aspect in their organisations. Creating a better understanding of the operating environment as well as its implications for the business outlook (sense making) are central aspects for improved performance. Instituting systems that improve strategic visibility can help to reduce endogenous uncertainty and provide

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685 Events such as, for example, the departure of the general manager, the introduction of price controls for pharmaceutical products, or the entry of competitors with copycat products in the telecommunications equipment market are not unique but have happened before in one or the other way in other countries or in other industries.


687 E.g. interviews FC42, SA73; FC45 (“organisational set-up did not provide for learning exchanges between different business groups”).
the company with superior dynamic capabilities. Such a system would integrate three main aspects: knowledge aggregation and dispersion, knowledge retention, and developing foresight.

- Knowledge Aggregation and Dispersion

The compartmentalisation of business activities in divisions and strategic business groups has led many MNCs to repeat mistakes in foreign expansion by not sharing crucial knowledge across such internal boundaries. Business units require clear incentives to share information that could be beneficial for other divisions. Too often they are discouraged to ask for help from corporate functions (e.g. through internal charging).

Many MNCs lack institutionalised processes that support knowledge aggregation on a country-level. Such processes include, for example, regular management meetings (e.g. on a quarterly basis) to discuss strategy and current issues in a forum comprising general managers of China subsidiaries and the country management (‘China board’). In some of the firms surveyed, such a forum included members of the global management team. Similarly, meetings for functional groups (e.g. finance, human resources) can add to the sharing of knowledge in a broader sphere.

Institutionalised functions such as ‘centres of expertise’ for the China operations can play extremely important roles in the development on both an operating and a strategic level. A relatively frequent ad hoc activity is the creation of a combined task force for setting up subsidiaries (JVs and WFOEs), e.g. staffed by the finance and legal functions. Another is the systematic search for ‘success stories’ within the subsidiary group.

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688 E.g. interviews EC87 (“silo structure, where especially in the beginning every business unit had their own experiences, resulting knowledge was not shared”; later information was centralised in the holding company); FC42 (“business units act all independent and ‘invent the wheel again’ each time one business group starts; little sharing of information”); EC12; EC83; FC45 and EC91.

689 See, for example, Lord and Ranft, 2000: p.579.

690 E.g. interview FC42 (“business units are reluctant to ask for help/support from the corporate function (only when serious problems emerge”).

691 E.g. interviews EC44; FA33; FA23 (most effective learning through “Friday think tanks – [a] meeting of young managers”).

692 E.g. interview EC91 (yearly meeting).

693 E.g. interviews EC12; FC14; EC32 (“companies have far to short expatriates cycles that are not long enough for managers to understand the complexity of the market and to live with their mistakes”).

694 E.g. interview EC12.

695 Interview EC93.
When asked for the most effective way that their company learns and transfers knowledge within their Chinese operations, many executives noted that they would transfer key employees (increasingly ‘locals’) throughout their China organisation.696

- **Knowledge Retention**

  The short cycle for expatriate secondments is also a substantial factor in the loss of knowledge and, ultimately, value.697 Still most of the key positions in large MNCs in China, where critical information is aggregated, are held by expatriates. Technology based systems that store information (e.g. presentations) can provide some basis for knowledge retention. Some companies keep checklists (to avoid previous mistakes) and databases of ‘lessons learned’ for critical knowledge to store such information.698 Such centralised knowledge is seen as a competitive advantage that is even conceded by rival firms.699 But most of the knowledge in such a dynamic and complex environment is too context specific to allow the separation of knowledge and the subject who gained the experience. In the end, the combination of investment in a well-designed human resource strategy700 as well as best practice guidelines for routine assignments will likely improve the preservation of vital knowledge.

- **Developing Foresight and Influence**

  Foresight requires a systematic understanding of the present and analysis of the past. For this it is necessary to decompose uncertainty into logical elements. These elements of uncertainty should become part of the strategic planning process – to be tracked for changes (an early warning system) but also to influence uncertainty where possible. Considering all sorts of uncertainty and their implications for specific subsidiaries as well as the group in the strategic planning progress can help provide the company with a rapid response. Even more important is to actively influence factors that contribute to uncertainty. Based on the assessment of these uncertainties, the most valuable options can be selected.

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696 E.g. interviews EC87; EC44 (“job rotation for Chinese manager/employees through different subsidiaries in China to ‘soak up’ experience there and therewith transfer knowledge to other places within the organisation; part of a career development plan to retain top performers”); and EA36 (“move people through different positions”; “foster career development”).

697 Interview FC42 (“not good at learning [due to] short expatriate cycles”).

698 E.g. interview EC44 (“database includes contacts (including minutes of meetings) and other know how; part of succession planning/hit-by-a-truck scenarios”).

699 Interview EC32 (“European firms do a good job to learn from their past experiences and concentrate the market knowledge at the centre”).

700 Interview EC85 (“current priority to attract, train and retain the best managers (have career development program to move them to small subsidiaries first)”.

Part of reducing endogenous uncertainty is to understand the demand (customers) as well as the supply side (competitors). While this is classically the role of marketing functions or the country-level strategy department (including competitive intelligence and governmental relations teams), these often lack a real mandate when the global headquarters takes the lead in corporate development. Such country-level corporate strategy functions are often effective in generating a better understanding of the dynamics of the market as well as to actively influence the potential developments into a favourable direction where possible.\textsuperscript{701}

7.1.2 Irreversibility: Active Portfolio Management

If the irreversibility of capital investments is high, firms need to plan their investments more carefully. The findings of this study suggest that firms encountering a high level of uncertainty should structure their investments using an options approach. This means parcelling resources in several subsidiaries that have a small initial scale instead of concentrating them in ‘big bets’.

The findings clearly support the idea that probing, rather than starting with aggressive growth strategies, is a more valuable strategy under high endogenous uncertainty. Equally, it is necessary to create a portfolio of investments if exogenous uncertainty is high and endogenous uncertainty reduced to acceptable levels.\textsuperscript{703} Portfolios, compared to single investments, provide a better basis for the exploration of a foreign environment. As Levinthal and March (1993: p.107) note: “Establishing preeminence involves exploration. Exploration is, on average, unfruitful, but it is the only way to finish first.”

Option-based management requires a clearly defined and tightly managed process that involves ongoing development of group companies and a review of key milestones at certain intervals.\textsuperscript{704} The management of operating flexibility at the subsidiary level and the corporate development of the subsidiary group in turn require a strong and activist role for headquarters as well as integrative operating systems.\textsuperscript{705}

\textsuperscript{701} As Levinthal and March (1993: p.102) note that in the long run “the use of power to impose environments is likely to result in atrophy of capabilities to respond to change. An organization becomes skilled at influencing its environment, but not at responding to the environment.”

\textsuperscript{702} E.g. interviews EC56 (“business intelligence group at the China holding level”); and EC32(“need to have an early warning system and influence government decisions before these are made”).

\textsuperscript{703} Or if joint venture partners are required, which can create additional endogenous uncertainty.

\textsuperscript{704} E.g. interview EC56 (“could be wise to invest in different promising areas and watch which ones will be successful; should then review milestones over fixed periods of time (e.g. every 5 years”).

\textsuperscript{705} Kogut, 1990: p.63.
There are a number of companies who consistently start small and create a portfolio of options in the process of a foreign entry and expansion. Such an option-based management involves strategic planning that considers external and internal contingencies that are uncertain at the outset. The execution of such a plan involves the development of investments and employees. The management of strategic options requires a rigid performance assessment, but lacking knowledge about such evaluation techniques and their use as strategic heuristic might contribute to the impression that MNC option portfolios have so far not been well managed.

### 7.1.3 Managerial Discretion: Governance Model

Organisational structure fundamentally influences the managerial decision-making on various levels. Managerial discretion and the associated strategic flexibility within an organisation are shaped by the way strategic decision-making is organised (affecting the speed and quality of decisions) as well as the corporate philosophy (entrepreneurial or hierarchical). The importance to choose the right organisational set-up is evident and many companies design their structure that might deviate in certain regions or countries – to match the environment.

1) Speed and Quality of Decision-Making

The speed of decision-making is crucial in highly dynamic markets. The length of reporting lines and centralisation of strategic decision-making inevitably result in a loss of time and information. Flexibility needs to be embedded in multiple ways in order to support an options-based management approach. MNCs have reacted in three ways to increase both the quality and speed of their decisions: (1) by shifting senior decision-makers into the region, (2) by establishing a strong country headquarters, and (3) by temporarily conceding more autonomy to their overseas subsidiaries.

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706 E.g. interviews FC42 ("company starts with the smallest factory possible to make it profitable and acquires/leases extensive idle land for future expansion"); EC99 ("increasing capacity over time and very cautious with initial investment size"); EC22 ("have [started with a minimum investment] in certain cases; more difficult for [a certain other business line], where more infrastructure is necessary"); EC32 ("starting small to learn first would be the way to go (and [our company] has done it like this in China"); and EA36.

707 E.g. interview EC44 ("Corporate development [...] follows a long-term strategy; [...] this results into a strategic plan and execution through developing investment and employees to make it work").


710 E.g. interview FC45 ("China is the only country in the [...] organisation that has a Country Strategy, all the rest of the world is managed along global [business group] strategies"); "have a high degree of autonomy and managed as a stand-alone organisation (with technical support from the global HQ)").

711 E.g. interviews EC93 ("Believe that it is important to have an organisation that is able to move fast"); and FC45 ("Need the flexibility for fast decision-making in a highly dynamic environment"); consistent also with arguments by D’Aveni (1994) and Eisenhardt and Bourgeois (1989a).
Board Decentralisation

The technological advancements over the last decade have allowed a further stage of board internationalisation – that of expatriating board members with regional responsibility (e.g. Asia) to the regional headquarters. As some, particularly European, corporate boards typically have a dual – functional / product as well as a regional – division of responsibilities among its members, this allows dramatically shortened reporting lines and close involvement at the most senior level. Such a high alertness can certainly help to improve both the speed and the quality of decision-making, as the board member will have a better understanding of the environment. Three of the companies surveyed have corporate board members with regional responsibility who are based in Asia.

Strong Country Functions

A strong country headquarters in highly dynamic and uncertain markets is widely considered a valuable platform for business development, government relations, and other corporate functions (e.g. for finance, tax and accounting). A great disadvantage of many organisations is that they constrain reporting within divisional channels that raise barriers to knowledge sharing – ultimately leading to largely independent sub-companies with the accompanying inefficiencies. For many firms, the use of country headquarters as a mediating agent and information exchange has proven to be tremendously valuable to centralise information at a level that is able to make its own interpretation of events through intimate knowledge of the general market situation as well as the development of subsidiaries. Managerial discretion at this level provides flexibility.

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712 Three firms interviewed have such an arrangement: FC14; FC29; and EA49. A manager at a competing firm (EC32) praised such a structure as a great way to “make quick decisions and as a counter-weight to business group”.

713 Two European (one chemicals firm and a pharmaceuticals firm) and an American firm (consumer goods).

714 It should be noted that the interviewees might be biased when stating this, as they are in many cases in charge of the country headquarters; Interview EC22 (business development is a country-level function in China and includes purchasing/sourcing; sourcing function can help to develop the China operations as potential partners are either competitors (horizontal co-operation) or suppliers (vertical co-operation/integration).


716 E.g. interview SA73 (“[the company’s global headquarters in Europe] is mainly looking at [global] competitors […] and do not understand what is happening in China.”).
Subsidiary Autonomy

When greater variance is sought in exploration, the organisational units should be loosely coupled. But autonomy conceded to overseas subsidiaries has to be clearly balanced with regard to the potential consequences. Less oversight can mean that subsidiary general managers might not act in the interest of the shareholders (a potential principal-agent conflict) and some country managers have pointed out that too much autonomy can also be harmful. On the contrary, too much oversight in a volatile environment can stifle corporate entrepreneurship. While subsidiary governance is a typical global oversight policy decision, the balance can be managed with more variance within the organisation and exceptions apply. Smaller subsidiaries are often conceded more autonomy, apparently in the belief that the close oversight would not add value but complexity. There have also been some examples where centralised companies made exceptions to their centralised structure and leave a successful entrepreneurial subsidiary (of large size) its autonomy where the high velocity environment clearly demanded a flexible local organisation. There might be less tolerance for loss-making subsidiaries. Ultimately, the level of control needed in the early phase will also be a question of competence and resulting trust in the general manager.

2) Entrepreneurs and Plant Managers

The set-up of subsidiaries typically goes through two distinct phases: The first is a formation and build-up phase (in many industries this takes one to three years) where the company makes many mistakes as it orientates itself within its environment. In this phase it is important to have a ‘start-up manager’, who has the experience, entrepreneurial mind and skill-set to launch and position the business. The second phase is the operating phase, where the company is in a more stable mode and can

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717 See McGrath, 2001: p.120.
718 Interviews EC12 (particularly referring to local general managers: “[they] all have good ideas, but it is important to control them”; “sometimes it proves afterwards that their ideas were right; others do not fit within the core business”); FA18.
719 See Buckley and Casson, 1998: p.36; interview SA73 (“in the early stage of its China expansion [our subsidiary] was competing neck-to-neck with a joint venture that [a competitor] had established. Both have been first [entrants] and were competing for the same market. [our company] centralised while [our competitor] decentralised, operating with separate subsidiaries and no holding company; the entrepreneurial spirit still alive; 10 years after the start of the two subsidiaries [our competitor] has double the size of [our subsidiary]”).
720 E.g. interview EA49 (“Have some smaller subsidiaries which are managed more entrepreneurial”).
721 E.g. interview SA73 (when the initiative to integrate reached the subsidiary, “this management style collide with the [subsidiary’s] entrepreneurial spirit and culture, which did not fit into the new structure – leading to fierce resistance from the joint venture management”; parent company decided to let the subsidiary “have its way but to introduce new products only in new subsidiaries in China”).
722 This was pointed out by the country manager of a large engineering firm (EC87).
work on improving operational effectiveness as well as to grow the business organically. A practice in some few MNCs is that managers with the appropriate skill-set for this phase then replace the start-up manager, who then moves on to start a new business at another location. In other cases, dual-leadership structures exist with a technical manager and commercial/financial manager. Such structure also typically incorporates a shift in emphasis from the technical manager, running the start-up, to the commercial manager, taking the lead at a later stage. Such a shift usually coincides with a parallel tighter integration into the global organisation.\footnote{E.g. interviews EC22 (“role of the General Manager has changed over the years”; “management of subsidiaries has become more directed by the technical operations department of the business segments, who manage their subsidiaries from the global head office”); and FC14.}

An implicit factor affecting entrepreneurial activity in subsidiaries is their ‘focus of attention’. In centralised MNCs the global headquarters is the key reference point, as subsidiary general managers need good relations with their superiors (visibility for their further career progress) and report requirements result in close coordination.\footnote{E.g. interview SA73 (“Decentralised companies have a higher speed of decision-making; but their primary advantage is that they concentrate on building with the local environment; centralised companies build their relationships with their global headquarters”).} Decentralised MNC subsidiaries typically focus their attention on the market as they are considerably less constrained by headquarters interference and are mostly measured by the strategic and financial results they achieve. The environment, many MNCs have experienced, requires an adaptation of the subsidiary strategy. This is particularly true for first movers, where the shift from the expensive market creation and development to a more cost-conscious mature organisation is inevitable to maintain profitability.\footnote{E.g. interview SA73 (“a first mover has to change strategy as soon as the market matures; originally it is creating and developing the market, which is expensive (need a lot of people)”; “a company cannot continue [to grow] like this forever […]. At that point, cost matters and budgets must be adhered to. Otherwise, competitors will come after the company, with lower cost and better managed. [our first subsidiary’s] sales flattened as the company was late to adjust its mode to the new situation”).}
7.2 The Options Cycle

An option model is inevitably a dramatic simplification of the actual continuous-time decision process. It can, however, help to visualise the value of uncertainty. When applying an options-approach to corporate expansion under uncertainty, options can be seen in cycles that respond to the level of exogenous and endogenous uncertainty.

For the entry and expansion in foreign (and, perhaps, other) markets, the development process is characterised by three major phases that have been portrayed in Chapter 5 as Probing, Diversifying, and Scaling. Each of these phases is closely associated with a phase in the option cycle. Contingent on the level of uncertainty an organisation should emphasise

1. creating an option to learn (probe),
2. creating a number of options to grow and abandon,
3. exercising of options.

Such an options-cycle is also reflected in the contingency framework (see Section 5.1).

Exhibit 27: Development of Strategic Options and Expansion Sequences

An example of a company that follows such approach is portrayed in Exhibit 27. Here, subsidiaries in the early phases are consistently created with small initial investment, which is then later expanded contingent on the development of the prospects. Joint ventures are later often bought out or, in other cases, abandoned or merged with other subsidiaries. Such development, consistent with the conceptual
considerations in Section 3.4.2 and the empirical findings in Section 5.2, results in a bell shaped development of the subsidiary group size where the number of subsidiaries is again drastically reduced in the Scaling phase (through exercising of options).

7.2.1 Creating an Option to Learn

There are several alternatives to learn – without entering a market with a manufacturing subsidiary – and stay flexible. One way to reduce uncertainty is to license a product to a local firm (which, of course, has other disadvantages) or export and wait for the market to grow. Another way is watching the market and competitors ‘from the fence’ until the market has reached a certain maturity. While this might lower uncertainty, evidence found in this study suggests that such passive learning does not sufficiently prepare companies for the actual entry and expansion when speed becomes critical. The option to learn is therefore a key element that starts the option cycle.

There are also reports that the experiential learning through the first subsidiary is more valuable than that of the following ventures – as they have the most to discover. Subsidiaries with an option character (small to medium sized) are designed to explore the market and discover new business opportunities. They represent a claim for the market and build a power base.

Speed of Expansion

The analysis of the creation of such option structures has shown that companies in most cases do not consider the level of endogenous uncertainty when devising their expansion strategy. They scale the subsidiaries too aggressively and incur the cost through the lower value (relative to their assets) they create in the process. There is a broad consensus that experiential learning takes time (the probing phase typically lasted 2-3 years), to absorb, to analyse and to disperse within the organisation. Consequently, a reasonably long learning period is necessary to be able to try different approaches and learn from them before moving on.

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726 E.g. interviews EC87; FC42; and EC22 (“try to phase over secured exported capacity into local markets to be able to start at sufficient economies of scale”).

727 E.g. interviews EC91; EC44; and EC56 (“aim to build and fill the capacity by local demand as good as possible – often waiting until the market has reached a certain stage”).

728 E.g. interview FA33 (“Learning is of most value for the experiences of first subsidiary (declining afterwards)”).
Timing of Expansion

While waiting to gain experience might be hard for managers impatient to be the first mover in their industry, there is convincing evidence through this study that the value of learning is higher than the benefit without this knowledge when the level of endogenous uncertainty is high.729 This is particularly true for dynamic and uncertain environments such as China, where most of the industries (if not all) accessible to foreign companies are extremely competitive. If a profit pool is visible or assumed, it will be competed away in relatively short time with a more companies chasing this profit pool, quickly leading to overcapacity. As Lieberman and Montgomery (1988: p.44) note, there are many markets where there is only 'room' for a limited number of profitable firms. Strategic actions, such as preferable deals with government authorities, might stake a claim on the market and limit the space available for following entrants.730 Few of the companies surveyed that have been first movers regret such a move.731 Many of the first movers were able to shape the market and carve out a lasting competitive position. Such situations often proved to be very profitable for their investors.732 Early entrants have also often experienced better relationships with government authorities.733 As a result, an early investment might confer privileged investment terms and more future opportunities compared to later entrants.734 The conclusion of the prior chapters is that being a first mover is indeed helpful, but more important is the right scaling of the subsidiary under high uncertainty (i.e. small).

The degree to which companies are able to choose the timing of investment is also to some degree dependent on their technological advantage of their products.735 If a company possess proprietary technology for which there is local demand but no

729 Supporting Dixit's (1989) numerical calculations.
730 Examples of such 'deals' that have been widely reported in the news include Volkswagen’s long-time privileged relationship with Shanghai Automotive Industrial Corporation or Siemens’ early joint venture with the Beijing Ministry of Telecommunications. Both resulted in dominance of their market segments for considerable time.
731 E.g. interviews FC90 (“it was good to be early in the market”); EC12 ("being first is important, trying in any case to be one of the first to set up shop in a given business line"); EC22 ("have been relatively early in the market, with the result that [company] and one other Chinese company dominate the market [in this segment]"); and EC56 (specialty chemicals firm; “believing in first mover advantage”).
732 E.g. interview SA73 ("[subsidiary] started in 1989 and became one of the most profitable companies in the [industry] in China"; “did not want to wait for the market to eventually develop itself, but rather wanted to actively shape and develop it”).
733 Interview FC14 ("early exposure ensured a better relationship with government authorities").
735 E.g. interviews EC67 ("It is not necessarily important to get in early - depends on competitive / technological advantage. Products that have a high level of technological advantage don't need to be localised"); and SA80 ("technological advantage that brought [our company] the necessary leverage [to not invest in joint ventures]").
capabilities for local production, a company can choose to export and wait out uncertainty longer than competitors who rely on more ‘commoditised’ technology.

The example of Nokia in China, as portrayed by Luo and Park (2001: p.144), underscores the value of the option to learn. Nokia, in contrast to its competitor Motorola, did not commit substantial resources – and waited out uncertainty – until the Chinese government had endorsed the GSM standard. Once the standard for mobile communications was set, the company swiftly and substantially expanded its China presence and soon dominated the market for mobile phone handsets. Motorola had made a big bet on an alternative technology and was slow to switch its stance.

7.2.2 Creating Options to Grow and Abandon

When a probe, or ‘option to learn’, has yielded sufficient local market knowledge and operating capabilities in the new environment, it is important to use this knowledge to develop a clear and systematic understanding of the prevailing uncertainty before embarking on an expansion wave (reducing endogenous uncertainty). An uncertainty landscape (as discussed above) can help to position the firm and to identify where investment opportunities might arise over time. It is critical, as Miller and Waller (2003: p.102) note, to determine first which exposures enhance the value of subsidiaries and which do not. The evaluation of opportunities on a continuous basis allows comparison of projects and a ranking of priorities. The core principles that have been developed in this study emphasise corporate entrepreneurship through the creation of growth options and option portfolios.

Small Investments (internal options)

The results of the statistical analysis of subsidiaries clearly support the idea that early investment for capital-intensive firms in this phase should be relatively small (to medium) scale, option-type character when uncertainty is high. The analysis of the qualitative inquiry yielded similar results for many industries. Large-scale investments, particularly under high uncertainty and for first entrants, were largely underperforming in the subsidiary sample under review. This was confirmed in the separate qualitative inquiry, which found that many of the ‘big bets’ encountered in the empirical investigation were retrospectively seen as planning mistakes.

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736 GSM stands for Global System for Mobile communications.
737 E.g. interviews EC93; and SA73.
738 E.g. interview SA73; and EC93 (“Most companies that have started with ‘big bets’ have learned in hindsight that this was not a good approach for China”).
However, it should also be noted that the study found that some industries might have different operating characteristics.\textsuperscript{739}

An important characteristic of successful subsidiaries appears to be that they operate in well-chosen business areas, with a focused mandate and that they are equipped with sufficient resources (technology, capital and managerial talent) to develop internal capabilities to participate in external growth.\textsuperscript{740}

**Acquisitions (external options)**

External options, such as acquisitions, are a second way to expand quickly. Contingent claim structures, such as toll manufacturing, can also represent an option to grow – for example if an MNC owns the right to acquire the local toll manufacturer at a preset price.\textsuperscript{741} In other firms, particularly in industries where manufacturing plants take a long time to build, acquisitions are seen as a quick way to expand activities and seen as an ‘option’.\textsuperscript{742}

**Option Portfolios**

The *Options Cycle* (see Exhibit 28) starts with a small Probing investment, to learn how to operate and create first-hand experience (‘option to learn’) – reducing endogenous uncertainty. Once the company possesses the capabilities and the knowledge about how and where to invest, it can shift its focus to operating and strategic issues regarding growth. The variation of partners, regions, and products provides different insights that can then be used to plan the way forward.

Exogenous uncertainty (randomness of outcomes that is largely resolved over time) can be addressed through varying the exposure and creating a portfolio of subsidiaries (or ‘strategic options’). Such a portfolio provides a flexible response to prevailing exogenous and endogenous uncertainty by increased variety, and as a consequence, more learning and expansion opportunities.\textsuperscript{743} More experiments will inevitably result in some failures, where subsidiaries turn out to be not viable but the

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\textsuperscript{739} Notably, firms in the consumer goods industry emphasized the need for ‘big bets’ and market leadership over potential misallocation of funds for their industry. This could be related to the observation by a manager of a technology firm SA80 that “being a first mover is seldom an advantage in China, except in industries such as consumer goods and services where having a strong brand, and capturing the mindshare are difficult to reverse”.

\textsuperscript{740} E.g. interviews EC67 (“important to choose the ‘battleground’ carefully; adequate resources are required – money and talent; would want to start small to create a beachhead”); FC45 (“being first is not important, but focus is”).

\textsuperscript{741} Interview EC56 (“involved in toll manufacturing with the option to acquire an equity share in the toll manufacturer”).

\textsuperscript{742} E.g. interview EC32.

\textsuperscript{743} E.g. interview SC95 (“Generally, being cautious in the market is good; have also experimented along the venture capital model: ‘invest in 10 companies and expect that at least one makes it’”).
legal separation can help to protect the wider organisation. Finally, contingent on the further development, promising strategic options are exercised – either by expanding, merging or abandoning subsidiaries.

**Exhibit 28: The Options Cycle**

![Diagram of the Options Cycle]

*Note: Time can only partially resolve exogenous uncertainty (primarily in a maturing/concentrating market development).*

*Source: Author*

7.2.3 Exercising of Options

Exercising of options, as noted earlier, is largely a question of timing. Chances are high that it will be either too early or too late. Exercising too late might mean that the opportunity has evaporated so that an expansion investment results in losses instead of the expected return. Exercising too early, will often lead to lost value, but might often ultimately be profitable.

In the case of expanding activities, many companies emphasized that it is important to move quickly once the time for exercise is there (e.g. through market signals such as deregulation). Slow implementation might also lead to an erosion of the anticipated option value. Of the two extreme contingencies, the abandonment of options is clearly more difficult than expanding operations. Abandoning subsidiaries is an undesirable, but in some cases necessary step to prevent

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744 E.g. interview SC95 (“Have intentionally organised the company in independent operating units (subsidiaries) to limit downside risk and protect [the parent company]”).

745 E.g. interview EC83 (“Miss opportunity if you wait too long, as many foreign – as well as increasingly Chinese competitors quickly erode potential opportunities”).

746 E.g. interview EC93 (“critical to expand fast as soon as judgement over the market development can be made and a subsidiary runs well; otherwise risk that competitors (in particular Chinese copy/learn from its success and pre-empt the company”).
continuous losses. It requires a clearly defined process that evaluates and addresses all consequences. The abandonment itself is clearly a challenge in many cases and should be recognised as such from the outset.

7.3 Implications for Managerial Practice

There are three key implications from this study for managerial practice. The first is that understanding uncertainty encountered in within-country foreign expansion, and how to influence it, is a key factor that should become high priority in the strategy process. In this context, it is important to understand what capabilities and knowledge are missing and to develop a systematic approach to gain them. Using a probe (option to learn) can provide essential information if endogenous uncertainty is dominant. It also means that analysing whether exogenous uncertainty can be reduced dramatically, for example through the creation of entry barriers, is crucial to finding the optimal path. While this might decrease the value of the option portfolio, it raises the total portfolio value of the group. The options cycle developed in this study might here provide conceptual guidance for the high-level planning of foreign expansion.

Second, it is important to realise how to structure the operations based on the surrounding uncertainty. A well-managed portfolio approach, where options are created, developed and abandoned following the option cycle, is an intuitive method to work with uncertainty and manage upside as well as downside surprises.

Third, ‘structure follows uncertainty’: the governance mode should reflect the learning needs of the organisation as well as the investment strategy. This typically means that autonomy is high during the start-up phase, slowly evolving to a low autonomy / high integration mode once uncertainty is substantially resolved. These stages require compatible manager types: entrepreneurial start-up managers while uncertainty is high (at high autonomy) and operations managers focused on efficiency when high integration becomes more necessary.

E.g. interviews EC56 (“clear process necessary which considers all consequences (e.g. of shutting down enterprises where technology has been transferred (managers could decide to carry on without [the company], what to do with otherwise loyal and successful managers and employees, ...”); and EA36 (“limit damage by helping that everybody has a job afterwards (inside or outside the firm)”).


Dynamic environments that require a high speed of decision-making, commonly also result in a high level of uncertainty.
8 Conclusion

This chapter presents the conclusions of this study: the general conclusions, contribution to the academic literature, as well as limitations and areas for future research.

8.1 General Conclusions

This dissertation has investigated the question of how MNCs should structure expansion under uncertainty in relation to the balance between flexibility and commitment. This balance is reflected in how companies structure investment and use strategic real options to develop their foreign operations. The study has conceptually and empirically examined the creation, value and exercise of capacity and ownership options in the context of foreign expansion. To ensure the necessary depth and scope, the research design has used multiple qualitative as well as quantitative methods to analyse the expansion chronologies and strategies of 41 MNCs since the re-opening of the Chinese market to foreign investment in the late 1970s.

The study was motivated by the need to better understand the mechanisms that influence at what time flexibility and at what time commitment is optimal. The findings support an initial conjecture that the ideal balance between flexibility and commitment shifts over time. The central conclusions reached are as follows:

1) Optimal expansion strategy is contingent on the level of uncertainty

The study of the expansion chronologies and strategies of MNCs in China has revealed that many firms structure their investments to match the level of exogenous and endogenous uncertainty. The discovery of the three phases of this ‘contingency framework’ – defined as Probing, Diversifying and Scaling – presents intriguing new insights for the foreign entry and expansion literature.

At the core of the contingency framework stands the influence of endogenous and exogenous uncertainty on the prevalent option type. The ideal response to each phase is found to be defined by the source and degree of uncertainty MNCs face (exogenous or endogenous) as well as their ability to influence it. Such response is characterised by the creation of an option to learn, creation of options to grow and abandon, and the exercising of options. The logic of these options influence the ideal group strategy characterised by the number and scale of subsidiaries over time.
2) **Options are preferable to big bets under high uncertainty**

Statistical analysis of subsidiaries supports the hypothesis that (in certain industries) the structuring of capital investments along option principles (i.e. starting with a small investment amount) has significant positive value under high uncertainty. These principles suggest a certain adequacy between capital and uncertainty. Subsidiaries that have started small under high endogenous uncertainty were found to be more valuable than Big Bets, large pre-emptive investments under high uncertainty. Investments into a number of small options provide a twofold response to uncertainty: first, they typically create more strategic opportunities than concentrated larger investments, and second, they generally limit the capital outlay to the initial investment and thereby provide protection against adverse factors specific to the subsidiary (e.g. uncooperative partner or poor location).

The empirical evidence demonstrates that Big Bets are an inferior way of expanding into highly uncertain foreign markets. A flexible strategic posture as well as better diversification through a larger subsidiary portfolio is found to present far greater value for MNCs. However, there is one caveat with regard to this general value proposition for strategic options – boundary conditions apply.

3) **Boundary conditions apply**

This dissertation highlights some critical assumptions underlying strategic real options that have not found sufficient attention in the literature. The conceptual framework discusses many of the organisational boundary conditions – based on insights from the existing theory – that could potentially shape the optimality of an options strategy. The inquiry at the country headquarters level (through interviews) provided the first indication that structural factors (such as capital intensity) could influence the appropriateness of an options strategy. This working hypothesis was supported through a quantitative analysis of subsidiary data. Both enquiries conclude that industry-specific structural factors might be crucial determinants of whether an option-based strategy is indeed beneficial. The statistical tests even indicate that such a strategy – while on average beneficial for manufacturing companies – could, in certain industries, diminish value.

This represents a highly surprising discovery as this issue has so far gone unnoticed in the literature. So far, little research has empirically analysed the situations where real options are used conceptually in strategic and international
management research. A critical analysis of boundary conditions should come naturally as it represents the missing link in the application of a synthetic theoretical framework based on mathematical assumptions (i.e. option pricing theory) to the more complex real world. It is an area that requires urgent attention as many conceptual analyses rely too much on an assumption of equal states of the real and ideal world of financial economics.

8.2 Contribution to the Academic Literature

The combination of qualitative and quantitative as well as longitudinal and cross-sectional analyses in this study provides important new insights for the real options theory at a subsidiary or plant-level. Such research has long been missing in the strategic-options perspective. In their criticism of existing research on real options, Adner and Levinthal (2004: p.83) note that “real options may be better suited to well-specified investment, such as overseas production facilities”. A similar conclusion was reached by Carruth et al. (2000: p.149), who found that the most insightful research could be expected by firm or plant-level longitudinal data.

The present study is – to the best of author’s knowledge – the first to provide the long-needed support for the central proposition of the strategic-options perspective that such flexibility has monetary value even if applied as a strategic heuristic. It is also the first to note a potential inverting effect induced by industry-specific boundary conditions. There are a number of wider implications from this study for the three related theory streams discussed below.

8.2.1 Foreign Entry and Expansion

This dissertation contributes to the literature on foreign entry and expansion in two significant ways: (1) it integrates ideas from real options theory with findings from international and strategic management literature; and (2) it proposes a contingency framework (Probing, Diversifying, Scaling) that can be interpreted as a logical, though more complex extension of the Johanson and Vahlne (1977) chain-of-establishment framework.

McGrath (1997) is one of the few authors in the strategic management field who has addressed boundary conditions, although only conceptually.
Integrating Real Options into International Management

The study of foreign expansion of MNCs is a relatively new field where to date few studies have ventured to analyse sequential investment patterns.\textsuperscript{751} The present study deviates from earlier studies in its focus on both single subsidiaries and subsidiary groups, rather than confining itself to solely to the former as has been customary in international management literature. This allows a more comprehensive analysis of strategic real options, which requires a longitudinal view (as option value is realised over time) as well as a portfolio perspective.

Applying real options theory to foreign expansion under uncertainty appears to be an ideal fit. Many of the existing insights in the international management literature that relate to learning and experience in foreign markets (incl. liability of foreignness, cultural distance, \textit{etc.}) have implications for the endogenous uncertainty of foreign entrants, and therewith implicitly for the options perspective. However, these have so far not been conceptually integrated in a systematic framework that would incorporate the two fields. The coalescence of the different streams provides a new basis for research in the international management field.

A central idea underlying the conceptual framework developed in this dissertation is that subsidiaries can be seen as strategic options to the parent company. While this thought has been similarly applied in earlier inquiries that were focused on specific types of subsidiaries (\textit{e.g.} joint ventures),\textsuperscript{752} a holistic conceptualisation of strategic options in the international management field has so far been missing.

The theory building and testing in this dissertation contributes to earlier arguments that managers should consider contingencies (endogenous and exogenous uncertainty) when planning the entry and expansion into spatial markets,\textsuperscript{753} and structure the organisation accordingly.\textsuperscript{754} The findings equally corroborate the sequential nature of investment – proposed by Johanson and Vahlne (1977)\textsuperscript{755} – albeit with a more dynamic view and the explicit necessity to scale-down (abandon) engagements that have passed a certain threshold level that defines failure.

\textsuperscript{751} See Chang and Rosenzweig, 2001: p.750.
\textsuperscript{752} See Kogut, 1991.
\textsuperscript{753} Potentially the findings might also have some relevance in product markets.
\textsuperscript{754} See Lawrence and Lorsch, 1967: p.158.
\textsuperscript{755} A notable difference is that Johanson and Vahlne’s (1977) study approached the topic based on insights from the behavioural theory of the firm, while this study emphasises a financial logic for a similar phenomenon.
The findings of this study also provide new insights for the analysis of first-mover advantages in spatial markets. This study provides qualitative support for the supposition that being first, or at least early, is valuable - but deviates from extant theory by providing a qualification to this relationship. Being a first mover, as the results of the statistical analysis appear to suggest, is only valuable to MNCs as long as the investment is small and the company can acquire operating capabilities and market knowledge on the way.

The Contingency Framework: Probing, Diversifying and Scaling

The proposed contingency framework substantially extends existing conceptualisations of foreign entry and expansion. There are three main findings that are integrated into this framework. First, it is found that a high responsiveness (subsidiary autonomy) evolves to high integration, corroborating earlier observations by Taggart (1998: p.675). Second, the focus on exploration evolves into a focus on exploitation as uncertainty decreases. Third, the different phases are characterised by distinctively different missions and options: the creation of an option to learn in the Probing phase, the creation of options to grow and abandon in the Diversifying phase, and the exercise or abandonment of options (both ownership and capacity) in the Scaling phase.

The research pioneered by Chandler (1962) and Lawrence and Lorsch (1967) established a clear relationship between the environment’s effect on strategy and, ultimately, on the internal structure of the firm. This study builds directly on these findings. Structure, the present study implies, is more than the governance structure of the hierarchical organisation as traditionally defined in strategy and international management research, as it is also the result of organisational separation into legal entities and resource allocation to subsidiaries. Strategy can be seen as a systematic approach for future wealth creation – here set in relation to the logic of real options. Analogous to Chandler (1962) and other authors investigating the environment-strategy-structure relationship, this study also supports the notion that environmental and strategic factors influence all firms. Firms react similarly to environmental challenges and change their structure to fit the circumstances. The design challenge for the structure is to constantly adapt to the changing

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757 The framework can be interpreted as the process that follows once the first manufacturing subsidiary has been established – which is the last phase in the chain of establishment framework by Johanson and Vahlne (1977).
758 See Hedlund and Rolander, 1990: p.16.
The proposed contingency framework is also closely related and adds to observations by Stopford and Wells (1972: p.19), who recognise two phases in international (outbound) expansion: an initial phase of autonomy for the foreign subsidiary, and a second phase of organisational consolidation. They also found that companies were experimenting with small overseas subsidiaries. While the ultimate strategy in outbound expansion might differ substantially from that in inbound expansion, the principal activity – exploration with minimal exposure to downside risk and response to a changing environment and knowledge base (affecting uncertainty) – reveals some remarkable parallels to the contingency framework presented in this study.

### 8.2.2 Subsidiary Management and Role

The longitudinal perspective and the incorporation of uncertainty as a key moderator provide important new perspectives on traditional subsidiary orientations and roles. The role of market-seeking subsidiaries has been found to change dramatically over time, providing a further dimension of analysis to the traditional cross-sectional clustering of strategic roles. Furthermore, the roles of subsidiaries are found to be shaped more through environmental circumstances (such as uncertainty) and the creation or exercising of options than by capability contribution aspects that have long dominated the discussions of subsidiary roles in more mature markets.

The findings of this dissertation also substantiate earlier insights from the literature on headquarters-subsidiary relationships, which are integrated into the contingency framework. With the evolution of subsidiary roles from an exploration to an exploitation mode, supervisory needs change. This corresponds with a parallel movement in the integration-responsiveness framework. Subsidiaries were found to be characterised by a mode of high responsiveness at an early stage (Probing/Diversifying phase) that changed when the subsidiary size required closer integration into the global organisational structure (in the Scaling phase). This observation fits well with findings by Hedlund (1981: pp.53-54) that subsidiaries become tighter controlled and integrated by the parent companies as subsidiary size increases.

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763 See, for example, Hedlund, 1981.
764 See Prahalad and Doz, 1981.
8.2.3 Strategic Options Perspective
There are four important contributions out of this dissertation for the strategic options perspective. One is a more precise definition of option types into vertical classes (Country-level, Subsidiary-level; Operating-level), effect-based option types (capacity and ownership), as well as a comprehensive discussion of scaling-type options (grow, learn and abandon) and their organisational boundaries. These classifications can help to avoid the often ambiguous and vague references to ‘potential options’ in organisations. The second is a conceptual integration of endogenous uncertainty in an international context. Previous research on strategic options has a predominantly national focus that results in a broad and ambiguous endogenous uncertainty concept. An international context provides an environment where endogenous uncertainty is generally higher. This allows a better framing and testing of the concept that might then be carried over to other contexts. The third important contribution is the empirical investigation of boundary conditions. The discovery that there are industry-specific boundary conditions that could in fact invert the effect is remarkable. Finally, the evidence for the value of capacity options provides long-needed evidence to a central claim in the strategic options perspective that has so far not been empirically supported.

8.3 Limitations and Areas for Further Research
One of the obvious limitations of this study is the question of generalisability of the sample. The focus on a single and relatively large market restricts the direct transferability of insights to other markets. The evolving regulatory framework is equally unique to the country, despite many parallels with other emerging markets. Focus on a single market brings, however, a better comparability of expansion chronologies – within and among industry clusters. Replicating the study in other spatial markets is needed to derive broader implications. Equally, ‘translating’ the findings (in particular the contingency framework) to other settings such as corporate venturing (e.g. in the case of the Virgin Group Plc) or industrial policy (e.g. through state-directed policy-making as observable in China) and examining them empirically might add to the core framework.

An extension of the study could also focus on smaller companies with less abundant resources. The companies investigated – some of the biggest global corporations – are hardly representative of the overall MNC population. Size does matter and this study has been careful to emphasise that this is a crucial boundary
condition. Smaller firms with limited financial slack for future expansions will be constrained in their expansion potential at various ends.

The measurement of investment under exogenous uncertainty equally warrants further study. The volatility and industry dynamics, particularly in a country like China, will have a tremendous effect on the creation, value and exercise of options. It is, however, very difficult to find adequate proxies that replicate this uncertainty. It is quite possible that under other circumstances a more telling exogenous uncertainty proxy could be created. This could yield additional insights about the structuring of investment in subsidiaries. The same is applicable to endogenous uncertainty. While the chosen proxy based on group experience is both intuitive and significant in the findings, alternative measures in a replication of the study could help to further validate the results. The tabulation of different types of options has shown that divergent mechanisms seem to be at work. The qualitative enquiry laid out in Chapter 5 has already indicated the existence of these ‘boundary conditions’. These, however, need more in-depth empirical work, both quantitative and qualitative, to dissect the underlying mechanisms. The importance of capital intensity for capacity options appears to be the first step in the direction of what should be a highly interesting field for further research.

Research on subsidiaries clearly requires a more longitudinal research design than has been prevalent in many studies on their strategic roles. Equally important, as this study clearly shows, is the consideration of group effects beyond networks and strategic contribution effects to structural factors such as economic portfolio risk.

Measurement of capacity and ownership options through the phases of expansion also needs more attention in international management research. The within-country foreign expansion provides a fascinating context for such analyses. The seminal work on the chain-of-establishment by Johanson and Vahlne (1977), which suggests that the establishment of a manufacturing enterprise in a foreign market is the last stage of internationalisation, has unfortunately led researchers to focus too much on the general internationalisation process itself (outbound) instead of the localisation and expansion process that follows the first manufacturing enterprise (inbound). The understanding of the latter, it is argued here, can provide many more important – and potentially surprising – new insights that are highly relevant to management practitioners and researchers alike. The strategic real options perspective certainly has a lot to contribute to this field – at the very least, the promising ability to see also the positive side of uncertainty.
9 References


Economist Intelligence Unit. 2004. *Coming of Age: Multinational Companies in China*, June: Hong Kong et al.


## Appendix

### Appendix A) Sampled Population

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<tr>
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### Exhibit 29: List of Companies in Sampled Population

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<td>FRA</td>
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<tr>
<td>95</td>
<td>Seiko Epson</td>
<td>Computers, Office Equipment</td>
<td>J</td>
</tr>
<tr>
<td>#</td>
<td>Multinational Company</td>
<td>Industry</td>
<td>Country of Origin</td>
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<td>96</td>
<td>Sharp</td>
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<td>97</td>
<td>Siemens</td>
<td>Engineering</td>
<td>GER</td>
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<tr>
<td>98</td>
<td>Solvay</td>
<td>Chemicals</td>
<td>BEL</td>
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<tr>
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<td>J</td>
</tr>
<tr>
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<td>Sumitomo Electric Industries</td>
<td>Electronics</td>
<td>J</td>
</tr>
<tr>
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<td>Sun Microsystems</td>
<td>Computers, Office Equipment</td>
<td>USA</td>
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<td>Swire Pacific</td>
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<td>HKG</td>
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<td>103</td>
<td>Thyssen Krupp</td>
<td>Industrial &amp; Farm Equipment</td>
<td>GER</td>
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<td>104</td>
<td>Toshiba</td>
<td>Electronics</td>
<td>J</td>
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<td>105</td>
<td>Tyco International</td>
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<td>USA</td>
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<td>106</td>
<td>Tyson Foods</td>
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<tr>
<td>107</td>
<td>Unilever</td>
<td>Consumer Food Products</td>
<td>UK/NL</td>
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<tr>
<td>108</td>
<td>United Technologies</td>
<td>Aerospace and Defense</td>
<td>USA</td>
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<tr>
<td>109</td>
<td>UPM-Kymmene</td>
<td>Forest &amp; Paper Products</td>
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<td>Valeo</td>
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<td>Wyeth</td>
<td>Pharmaceuticals</td>
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<tr>
<td>114</td>
<td>Xerox</td>
<td>Computers, Office Equipment</td>
<td>USA</td>
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</tbody>
</table>

**Note:** Global manufacturing firms excluding the following capital-intensive manufacturing industries: automotive (OEM), chemicals, energy, oil and gas, mining and metals, as well as semiconductors

**Source:** Fortune Global 500; Toyokeizai Data Bank 2000 (a Japanese subsidiary directory)
### Appendix B) Interview Directory of Response Sample

#### Exhibit 30: List of Interviews (Sorted by MNC)

| Company / (Global HQ) | Name                     | Position                                                            | Date / Time of Interview       | Location            |
|-----------------------|--------------------------|                                                                    |                                  |                     |
| **ABB (Switzerland)** | Rolf Schaumann           | **Fmr. President, China operations**                               | 17 Nov 03 1430h to 1630h       | Baden, Switzerland  |
|                       | Tony Zeitoun,            | **Chief Financial Officer, China operations**                      | 15 Jun 04 1000h to 1100h       | Beijing, China      |
| **Alcatel (France)**  | Dominique de Boisseson   | **President, China operations**                                    | 2 Jul 04 1630h to 1740h        | Shanghai, China     |
| **Alstom (France)**   | Alain Berger             | **President, China operations**                                    | 16 Jun 04 1510h to 1610h       | Beijing, China      |
| **AkzoNobel (Netherlands)** | Olaf Rietveld      | **Chief Financial Officer, China operations**                      | 2 Jun 04 1115h to 1230h        | Beijing, China      |
| **Asahi Glass (Japan)** | Toshio Nagayama         | **President, Chemicals Group China operations**                    | 12 Jul 04 1500h to 1700h       | Shanghai, China     |
|                       | Eunice MW Chang          | **Deputy Chief Representative China, Chemicals Group**             | 12 Jul 04 1500h to 1700h       | Shanghai, China     |
| **Bayer (Germany)**   | Ernst Coppens            | **Chief Financial Officer, China operations**                      | 9 Jul 04 1000h to 1100h        | Shanghai, China     |
|                       | Stefan Klamroth          | **Fmr. Chief Financial Officer, China operations**                 | 4 Nov 03 1600h to 1645h        | Telephone           |
| **BASF (Germany)**    | Jörg Wuttke              | **President, China operations**                                    | 11 Jun 04 0900h to 0950h       | Beijing, China      |
| **Caterpillar (USA)** | M.C. Chan                | **President, China operations**                                    | 15 Jun 04 1500h to 1600h       | Beijing, China      |
| **Ciba Specialty Chemicals (Switzerland)** | Robert Heiniger | **President, China operations**                                    | 5 Jul 04 1330h to 1500h        | Shanghai, China     |
| **Cisco Systems (USA)** | Rosa Huang               | **Director, Corporate Strategy China**                             | 21 Oct 04 1400h to 1430h       | Telephone           |
| **Degussa (Germany)** | Eric Baden               | **President, China operations**                                    | 12 Jun 04 1450h to 1550h       | Beijing, China      |
| **DSM (Netherlands)** | Ari van der Steenhoven  | **President, China operations**                                    | 8 Jul 04 1500h to 1600h        | Shanghai, China     |
| **Eastman Kodak (USA)** | Karen Smith-Pilkington | **President, Asia Pacific**                                         | 17 June 04 1740h to 1810h      | Telephone           |
| **Eli Lilly (USA)**   | Richard Smith            | **President, Asia Pacific**                                         | 29 Apr 04 1010h to 1110h       | Hong Kong, China    |
## Exhibit 30: List of Interviews (Sorted by MNC)

<table>
<thead>
<tr>
<th>Company / (Global HQ)</th>
<th>Name</th>
<th>Position</th>
<th>Date / Time of Interview</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresenius (Germany)</td>
<td>Jürgen Lauterbach</td>
<td>Chief Financial Officer, Asia Pacific</td>
<td>19 Oct 04 0915h to 1015h</td>
<td>Hong Kong, China</td>
</tr>
<tr>
<td>GlaxoSmithKline (UK)</td>
<td>Zenon Zdunek</td>
<td>Head of Manufacturing, Asia</td>
<td>4 Nov 04 1000h to 1100h</td>
<td>Telephone</td>
</tr>
<tr>
<td>Henkel (Germany)</td>
<td>Michelle Cheung</td>
<td>Chief Financial Officer, Asia Pacific</td>
<td>13 Apr 04 1700h to 1740h</td>
<td>Hong Kong, China</td>
</tr>
<tr>
<td>Honeywell (USA)</td>
<td>Jeffrey Song</td>
<td>President, China operations</td>
<td>15 Jul 04 0930h to 1030h</td>
<td>Shanghai, China</td>
</tr>
<tr>
<td>IBM (USA)</td>
<td>Charles Wu</td>
<td>Director, Strategy and Development</td>
<td>18 Jun 04 1100h to 1145h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td>Nestlé (Switzerland)</td>
<td>Thierry Vappereau</td>
<td>Head of Planning</td>
<td>17 Jun 04 1040h to 1120h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td>Novartis (Switzerland)</td>
<td>Paul Lau</td>
<td>President, China operations</td>
<td>7 Jun 04 1005h to 1115h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td>Pfizer (USA)</td>
<td>Al Gabor</td>
<td>President, China operations</td>
<td>19 Jul 04 1400h to 1450h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td>Roche (Switzerland)</td>
<td>Antonio Chow</td>
<td>President, China operations</td>
<td>5 Jul 04 0930h to 1000h</td>
<td>Shanghai, China</td>
</tr>
<tr>
<td></td>
<td>Frank Mrongowius</td>
<td>Director, Business Development (Diagnostics) China operations</td>
<td>14 Jul 04 1000h to 1100h</td>
<td>Shanghai, China</td>
</tr>
<tr>
<td>Saint Gobain (France)</td>
<td>Gerard Laigroz</td>
<td>President, China operations</td>
<td>22 Jun 04 0920h to 1100h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td>Schneider Electric (France)</td>
<td>Cyril Perducat</td>
<td>Director, Business Development China</td>
<td>22 Jul 04 0815h to 0900h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td>Siemens (Germany)</td>
<td>Dirk Westphalen</td>
<td>Director, Strategic Planning and Corporate Development China</td>
<td>11 Jun 04 1500h to 1600h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td></td>
<td>Du Jian Ping</td>
<td>Fmr. Senior Analyst, Strategic Planning and Corporate Development China</td>
<td>9 Sep 04 1300h to 1400h</td>
<td>Berkeley, USA</td>
</tr>
<tr>
<td></td>
<td>Martin Ecknig</td>
<td>Fmr. Executive Commercial Manager (Siemens Factory Automation Engineering)*</td>
<td>10 Oct 03 1115h to 1205h</td>
<td>Telephone</td>
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<tr>
<td></td>
<td>Michael Schmermer</td>
<td>Fmr. General Manager (Siemens Technology Development Corp.)*</td>
<td>11 Oct 03 0900h to 1005h</td>
<td>Telephone</td>
</tr>
</tbody>
</table>
### Exhibit 30: List of Interviews (Sorted by MNC)

<table>
<thead>
<tr>
<th>Company / (Global HQ)</th>
<th>Name</th>
<th>Position</th>
<th>Date / Time of Interview</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvay (Belgium)</td>
<td>Huang Yi Jan</td>
<td>President, China operations</td>
<td>4 June 04 1100h to 1200h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td>Swire Group (Hong Kong)</td>
<td>Martin Cubbon</td>
<td>Chief Financial Officer (Corporate)</td>
<td>22 Apr 04 1010h to 1110h</td>
<td>Hong Kong, China</td>
</tr>
<tr>
<td>ThyssenKrupp (Germany)</td>
<td>Alfred Wewers</td>
<td>President, China operations</td>
<td>14 Jun 04 1500h to 1700h</td>
<td>Beijing, China</td>
</tr>
<tr>
<td>Unilever (UK / Netherlands)</td>
<td>Hans Rainer Schultheiss</td>
<td>Chief Financial Officer, China operations</td>
<td>7 Jun 04 1600h to 1745h</td>
<td>Shanghai, China</td>
</tr>
<tr>
<td>Volkswagen (Germany)</td>
<td>Dr. Bernhard Leissner</td>
<td>President, China operations</td>
<td>21 Jun 04 0900h to 0940h</td>
<td>Beijing, China</td>
</tr>
</tbody>
</table>

#### Interviews on Anonymous Basis

<table>
<thead>
<tr>
<th>Company</th>
<th>Position</th>
<th>Date / Time of Interview</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Semiconductor Company</td>
<td>Chief Financial Officer, Asia Pacific</td>
<td>3 Apr 04 1740h to 1810h</td>
<td>Hong Kong, China</td>
</tr>
<tr>
<td>American IT Company</td>
<td>Chief Financial Officer, China operations</td>
<td>31 May 04 1400h to 1600h</td>
<td>Beijing, China</td>
</tr>
</tbody>
</table>

**Notes:**
- Different titles were used for the president of the China operations including “President”, “CEO”, “General Manager”, “Chief Representative”, “Chairman”, “Chairman of the Board” but typically have the same function and are therefore all described as “President”.
- China operations in some cases include Taiwan.
- Fmr. = Former;
- * Subsidiaries of Siemens in China;
- A number of prior interviews made in 1998 and 1999 with senior China executives of large MNCs have also flown implicitly into this analysis, but cannot be named or listed here for formal reasons.
Appendix C) Curriculum Vitae

Marc-Oliver Thurner  
born: 15 Mai 1973 in Ulm, Germany

EDUCATION:
Oct 2002-    University of St.Gallen, Switzerland  
Sep 2005    Research Institute for International Management / Asia Research Centre  
            Doctoral Candidate / Teaching Assistant
Jan 2005 -    Australian Graduate School of Management, Sydney, Australia  
Apr 2005    Centre for Corporate Change  
            Visiting Scholar
Mar 2004 -    The Chinese University of Hong Kong, China  
Dec 2004    Department of Finance  
            Visiting Scholar
Oct 1993 -    University of Ulm, Germany  
Dec 1999    Master degree in Mathematics & Economics (Dipl. math. oec.)
1983 - 1992    Anna-Essinger-Gymnasium, Ulm / Germany

PROFESSIONAL EXPERIENCE:
Feb 2000 -    Merrill Lynch & Co., Inc, Frankfurt / Germany  
Dec 2002    Mergers & Acquisitions Group, Investment Banking Division
Jan 1999 -    Siemens Ltd., China, Beijing / China  
Mai 1999    Corporate Strategy & Business Development, China Headquarters
Sep 1997 -    Lehman Brothers, Frankfurt / Germany  
Nov 1997    Strategic Advisory Group, Investment Banking Division
Jul 1996 -    Coopers & Lybrand, Sydney / Australia  
Oct 1996    Management Consulting Services and Corporate Tax Division