

Oliver Btirgel • Andreas Fier • Georg Lichner  
Gordon Murray

# The Internationalisation of Young High-Tech Firms

An Empirical Analysis in Germany  
and the United Kingdom

With 21 Figures  
and 54 Tables



Physica-Verlag  
A Springer-Verlag Company

**ZEW**  
Zentrum für Europäische

Centre for European  
Economic Research

# Table of Contents

<b>Preface</b> .....	<b>V</b>
<b>1 Introduction</b> .....	<b>1</b>
1.1 New Technology-Based Firms, High-Tech Start-Ups and Globalisation.....	1
1.2 The Importance of NTBFs.....	2
1.3 Theoretical Dimensions of Internationalisation.....	6
1.4 Policy Dimensions.....	7
1.5 Managerial and Operational Dimensions.....	9
1.6 The Comparative Dimension: Germany vs. United Kingdom.....	10
1.7 Overview of the Report.....	12
<b>2 Theoretical Background and the Operationalisation of the Hypotheses</b> .....	<b>15</b>
2.1 Theoretical Background.....	15
2.1.1 Internationalisation Process Models.....	16
2.1.2 Internalisation Theory and Transaction Cost Economics.....	18
2.1.3 Monopolistic Advantage Theory and the Resource-Based View.....	19
2.1.4 Implications for Technology-Based Start-Ups.....	20
2.2 Empirical Evidence on International Entrepreneurship.....	21
2.3 Focusing Our Research Objectives.....	27
2.4 Research Hypotheses and Measurement Issues.....	29
2.4.1 Operationalisation of Dependent Variables.....	30
2.4.2 Operationalisation of Independent Variables.....	32
<b>3 Description of Methodology</b> .....	<b>37</b>
3.1 Choice of Method: Combination of Mail Survey and Interview Data.....	37
3.2 Operationalisation of the 'NTBF' Definition.....	38
3.3 Mail Survey Methodology.....	40
3.3.1 The Questionnaire.....	40
3.3.2 Identification of Data Sources and Sampling.....	42
3.3.2.1 The Use of Credit Rating Agencies Data.....	42
3.3.2.2 German Data Sources and Sampling Procedures.....	42
3.3.2.3 United Kingdom Data Sources and Sampling Procedures.....	43
3.3.3 Stratification and Sampling Procedure.....	44

3.3.4	Mailing and Response Pattern.....	48
3.3.5	Generating Observation Weights.....	49
3.4	Case Studies Methodology.....	50
3.4.1	Interview Methodology and Research Design.....	50
3.4.2	Conceptual Framework and Definition of Patterns.....	51
3.4.3	Matching Criteria.....	54
3.4.4	Data Collection.....	58
3.4.5	Case Study Analysis: Method and Process.....	58
<b>4</b>	<b>Descriptive Analysis of the Data Set.....</b>	<b>63</b>
4.1	Introduction.....	63
4.2	Firm-Specific Characteristics.....	64
4.2.1	Size Distributions of Firms.....	64
4.2.2	Age Structure of Surviving New Ventures.....	68
4.2.3	Industry Distribution.....	70
4.2.4	Description of the Knowledge Base of the Firms.....	75
4.3	Founder-Specific Characteristics.....	81
4.3.1	Size of Founding Team and Work Experience Prior to Start-Up.....	81
4.3.2	Joint Work Experience in Founding Team.....	82
4.3.3	Prior Work Experience of the Founding Team in an International Environment.....	84
4.3.4	Shortages of Skills.....	85
4.4	Characteristics of the NTBF Respondents' Most Important Products.....	89
4.4.1	Classification of the Best-Selling Product/Service.....	89
4.4.2	Potential of Product Differentiation and Transaction- Specific Sales Effort.....	91
4.4.3	The Technological Innovativeness of the Best-Selling Product or Service.....	94
4.4.3.1	Technology Choices Adopted by Respondent Firms.....	94
4.4.3.2	Competitive Advantage in Terms of Lead Time Over Competitors.....	98
4.5	Motives and Costs of the International Business Activities of NTBFs.....	101
4.5.1	Patterns of Motivation to Start International Business Activities.....	101
4.5.2	Strategic Commitment to International Sales.....	106
4.5.3	Costs and Constraints of Entering Foreign Markets.....	109
<b>5</b>	<b>Differences Between Internationalisers and Non-Internationalisers.....</b>	<b>113</b>
5.1	Descriptive Analysis.....	113
5.2	Determinants of the Decision to Internationalise in a Multivariate Framework.....	115
5.2.1	Interpretation of the Results of a Probit Model.....	116
5.2.2	Discussion of Results.....	120

5.3	The Decision to Internationalise: Introducing a "Threshold" of Internationalisation.....	121
5.3.1	Methodological Considerations.....	121
5.3.2	Model Results.....	122
5.3.3	Discussion of Results and Conclusions.....	126
<b>6</b>	<b>The Degree of Internationalisation.....</b>	<b>129</b>
6.1	Methodological Considerations.....	129
6.2	Descriptive Results.....	131
6.3	Econometric Analysis.....	132
6.3.1	Comparison of the Results with the Tobit Model.....	136
6.4	Conclusions.....	138
<b>7</b>	<b>The Timing of Entry into International Markets.....</b>	<b>141</b>
7.1	Hazard Functions and Economic Duration Models - Some Methodological Considerations.....	142
7.2	Describing the Timing of First International Sales.....	144
7.3	Estimation Results Using Hazard Functions.....	147
7.4	Timing of Internationalisation as a Result of Management's Discrete Choice.....	152
7.5	Summary.....	155
<b>8</b>	<b>Market Entries: Target Country and Entry Mode.....</b>	<b>157</b>
8.1	The Target Countries.....	157
8.2	Some Descriptive Statistics on Entry Modes.....	159
8.3	Determinants of the Choice of Entry Modes.....	161
8.3.1	Theoretical Considerations.....	161
8.3.2	Regression Results.....	162
8.4	Summary.....	168
<b>9</b>	<b>Firm Performance and Early Internationalisation.....</b>	<b>171</b>
9.1	Productivity and International Sales.....	172
9.1.1	Specification of the Labour Productivity Equation.....	172
9.1.2	Some Specification Problems.....	174
9.1.3	Results.....	175
9.2	Firm Growth and Internationalisation.....	178
9.2.1	Distribution of Growth Performance Across Young High-Tech Firms.....	179
9.2.2	Do International Sales Enhance Firm Growth?.....	180
9.2.2.1	Some Issues on the Econometric Specification of Models of Firm Growth.....	182
9.2.2.2	Econometric Results and Interpretation.....	183
9.2.3	Fast Growing and Fast Shrinking Firms.....	190
9.3	Summary.....	194

<b>10 Results of the British and German Case Studies.....</b>	<b>197</b>
10.1 The Decision and Timing of Internationalisation.....	197
10.1.1 Born Internationals.....	197
10.1.2 Late Internationalisers.....	200
10.1.3 Non-Internationalisers.....	201
10.1.4 Comparison Between the Three Internationalisation 'Types'! ..	203
10.2 Growth and Internationalisation.....	204
10.2.1 Fast Growing Firms.....	204
10.2.2 Low Growth Firms.....	207
10.2.3 A Comparison of Fast Growth and Low Growth Firms.....	211
10.3 Formal and Informal Sources of Venture Capital.....	212
10.4 Public Policy.....	215
<b>11 Summary and Conclusions.....</b>	<b>219</b>
11.1 Objectives of the Research Project.....	219
11.2 Research Findings Based on the Quantitative Approach.....	220
11.2.1 The Incidence of Internationalisation.....	220
11.2.2 Key Characteristics of the Sampled Firms.....	221
11.2.3 Differences Between Internationalising and Non-Internationalising Firms.....	227
11.2.4 The Degree of Internationalisation.....	229
11.2.5 Timing of Entry into International Markets.....	230
11.2.6 Target Countries and Mode of Entry.....	232
11.2.7 Firm Performance and Internationalisation.....	235
11.3 Results from the British and German Case Studies - The Qualitative Research Dimension.....	237
11.3.1 Timing of International Market Entry.....	237
11.3.2 Fast Growing vs. Slow Growing Firms.....	240
11.3.3 Formal and Informal Sources of Venture Capital.....	241
11.3.4 Small Business Grants from the Public Sector.....	242
11.4 Differences Between German and UK New Technology-Based Firms.....	244
11.5 Eighteen Research-Based Lessons for a Would-Be International, High Growth, New Technology-Based Firm.....	246
11.6 Research Implications for Government.....	247
11.7 Some Brief, Concluding Observations on 'Theory'.....	249
11.8 ...and Finally: Areas for Future Research.....	251
<b>References.....</b>	<b>253</b>
<b>Appendix.....</b>	<b>271</b>
Appendix A: Definition of High-Tech Industries.....	271
Appendix B: Questionnaire.....	273
Appendix C: Additional Tables for Chapter 4.....	277
Appendix D: Additional Tables for Chapter 6.....	285
Appendix E: Additional Tables for Chapter 8.....	286