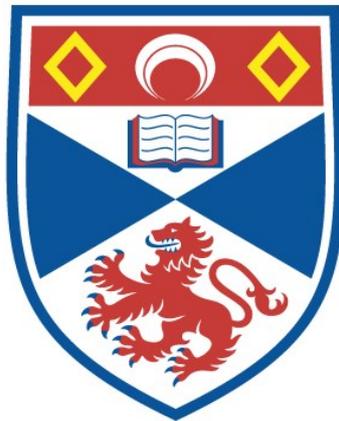


# **CORPORATE GOVERNANCE AND PRODUCT INNOVATION IN THE MACHINE-TOOL SECTOR IN ITALY**

**Francesca Visintin**

**A Thesis Submitted for the Degree of PhD  
at the  
University of St Andrews**



**2002**

**Full metadata for this item is available in St Andrews Research  
Repository  
at:**

**<http://research-repository.st-andrews.ac.uk/>**

**Please use this identifier to cite or link to this item:**

**<http://hdl.handle.net/10023/11116>**

**This item is protected by original copyright**

**Corporate governance  
and  
product innovation  
in the machine-tool sector in Italy**

**By**

**Francesca Visintin**

**Thesis presented for the degree of Ph.D.**

**University of St.Andrews**

**29<sup>th</sup> May, 2001**





I, Francesca Visintin, hereby certify that this thesis, which is approximately 95,000 word in length, has been written by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

Date 23/05/2001... Signature of candidate

I was admitted as a research student in September 1998 and as a candidate for the degree of PhD in MEP in September 1998; the higher study for which this is a record was carried out in the University of St.Andrews between 1998 and 2001.

Date 23/05/2001. Signature of candidate

I hereby certify that the candidate had fulfilled the conditions of the Resolution and Regulation appropriate for the degree of PhD in MEP in the University of St.Andrews and that the candidate is qualified to submit this thesis in application for that degree.

Date 29/5/01 Signature of supervisor.

In submitting this thesis to the University of St.Andrews I wish access to it to be subject to the following conditions:

For a period of 2 years from the date of submission, the thesis shall be withheld from use.

I understand, however, that the title and abstract of the thesis will be published during this period of restricted access; and that after the expiry of this period the thesis will be made available for use in accordance with the regulation of the University Library for the time being in force, subject to any copyright in the work not being affected thereby, and a copy of the work may be made and supplied to any bona fide library or research worker

Date 23/05/2001.. Signature of candidate .

# Abstract

In this thesis we study the influence of corporate governance on product innovation in the machine-tool sector in Italy. The theoretical framework employed in the analysis is part of the Systems of Innovation literature. It can be defined as a “national-technological system of innovation” type of approach as it distinguishes between countries with different systems of corporate governance and between sectors that employ different technologies. The main hypothesis is that variations in national systems of corporate governance can help to explain national patterns of sectoral specialisation.

The thesis focuses on the Italian National System of Innovation from the point of view of its corporate governance. The main characteristics of the system are analysed in the first part of the thesis where it is also shown how they can help to explain the Italian industrial specialisation. The study proceeds with an application of the theoretical framework to the analysis of the machine-tool sector, its technology and its historical evolution. A particular focus is put on the decline of the US in the sector during the 1970s and 1980s and the corresponding upsurge of Japan.

The final part of the thesis studies the Italian System of Innovation in the machine-tool sector. It highlights that firms are not the only actors in the System and that other stakeholders, such as customers and suppliers, play an important part in the innovation process. It shows also that the system presents some weaknesses, consisting mainly of the lack of financial resources, that need to be resolved. Our final argument, supported by an econometric analysis, is that one of the solutions suggested by the machine-tool builders association, namely a wave of mergers and acquisitions, is not necessarily the best answer. A stronger coordination and cooperation among competing and non-competing firms appears to be the most incisive solution from the point of view of innovation for this sector.

## TABLE OF CONTENTS

<i>Abstract</i>	ii
<i>Table of Contents</i>	iii
<i>List of Figures</i>	vii
<i>List of Tables</i>	viii
<i>Acknowledgments</i>	xi
INTRODUCTION	1
<b>1. Corporate governance and product innovation: a review of the literature</b>	<b>5</b>
1.1 Introduction	5
1.2 Innovation, innovating firm and systems of innovation	6
1.3 Theories of corporate governance	11
1.4 Systems of corporate governance	20
1.5 Corporate governance, innovation systems and industrial performance	22
1.5.1 The degree of <i>visibility</i>	23
1.5.2 The degree of <i>appropriability</i>	26
1.5.3 The <i>novelty</i> of innovation	28
1.5.4 Systems of corporate governance in terms of <i>industry-specific expertise, firm-specific perceptiveness</i> and strategy of appropriation	29
1.6 Tylecote and Lazonick compared	30
<b>2. Method</b>	<b>37</b>
2.1 Introduction	37
2.2 Research paradigm: the two philosophies	38
2.3 The method	39
2.3.1 The review of the literature	39
2.3.2 The case studies	42
2.3.3 Further interviews	49
2.3.4 The Mediocredito database.	50
2.3.5 The CIS database	52
2.3.6 The COPI survey	53

<b>3. The Italian system of corporate governance and sectoral specialisation</b>	<b>55</b>
3.1 Introduction	55
3.2 Firm-specific perceptiveness and industry-specific expertise	55
3.2.1 The main company organs	57
3.2.2 The structure of ownership and control	59
3.2.3 Structure of corporate finance	62
3.2.3.1 Bank-firm relations and corporate governance	64
3.2.3.2 The Italian equity market	72
3.2.3.3 Financial institutions	75
3.2.3.4 The venture capital market and the “Nuovo mercato”	75
3.2.3.5 The importance and diffusion of pyramidal groups	80
3.2.4 The market for corporate control	85
3.2.5 The Draghi reform and the Code of conduct	87
3.2.6 Public enterprises	91
3.2.7 The role of the public sector in innovation	94
3.3 Inclusion of the stakeholders	97
3.3.1 Customers and suppliers	98
3.3.2 Labour market	100
3.4 Matching corporate governance and industrial specialisation	103
3.5 The Italian sectoral specialisation	106
Conclusion	109
<b>4. The machine-tool sector</b>	<b>112</b>
4.1 Introduction	112
4.2 General characteristics of the sector	112
4.3 Historical background	115
4.4 Characteristics of the sector in terms of <i>novelty</i> , <i>appropriability</i> and <i>visibility</i>	117
4.5 The decline of the US and the upsurge of Japan: an attempted explanation	129
<b>5. Case studies</b>	<b>139</b>
5.1 Introduction	139
5.2 Introduction to Stam	140
5.3 The process of innovation	142

Conclusion	151
<b>6. The Danieli Group</b>	<b>153</b>
6.1 Introduction	153
6.2 The steel industry: two possible technologies	153
6.3 The characteristics of the sector in terms of novelty, visibility and appropriability	159
6.3.1 The degree of novelty of technology and technological change	159
6.3.2 The degree of visibility	160
6.3.3 The degree of appropriability	161
6.4 The Group	161
6.4.1 The history of the Group	161
6.4.2 The structure of the Group	164
6.4.3 The Holding: Danieli & C. SpA	165
6.4.3.1 The degree of appropriability and inclusion of the stakeholders	166
6.4.3.2 Visibility and firm-specific perceptiveness	168
6.4.3.3 The degree of novelty	176
6.5 One of the foreign subsidiaries: Morgårdshammar	177
6.5.1 The Company and its history	177
6.5.2 The process of innovation	178
6.5.2.1 Firm-specific perceptiveness and industry-specific expertise	179
6.5.2.2 “Inclusion of the stakeholders” or “Shareholders first” strategy?	183
6.6 Recent changes and conclusions	186
<b>7. Corporate governance and product innovation in the     machine-tool sector in Italy</b>	<b>191</b>
7.1 Introduction	191
7.2 The machine-tool sector: the historical background	191
7.3 Structure of the industry and corporate governance system	196
7.3.1 Internal Visibility	196
7.3.2 Visibility towards the outside	200
7.3.3 Appropriability and inclusion of the stakeholders	206
7.3.4 Novelty	212
7.4 Groups of firms, independent firms and innovation	213

7.5 The sample of firms, descriptive statistics and simple inference	216
7.6 Empirical results: econometric analysis	224
Conclusion	229
Appendix 1	237
Appendix 2	246
Appendix 3	265
Appendix 4	266
Bibliography	275

## LIST OF FIGURES

Figure 3.1 Largest Owners' share over 50%	60
Figure 3.2 Diffusion of forms of control in Italian firms according to firm size	61
Figure 3.3 Corporate financial structure 1989-1992	63
Figure 3.4 Interlocking directorates in 1990. Source: Ferri and Trento (1997)	68
Figure 3.5 The role of Mediobanca	70
Figure 3.6 Annual European Private Equity Investment (€ million)	76
Figure 3.7 Private Equity investments. Number of operations, number of firms and amount invested	77
Figure 3.8 Fund Distribution by Stage of Investments 1999	78
Figure 3.9 Origin of the funds invested	78
Figure 3.10 Sectoral distribution of investments in 1998-1999	79
Figure 3.11 Percentage of investments in high-tech firms	79
Figure 3.12 Diffusion of groups among manufacturing firms	83
Figure 3.13 Diffusion of groups in different sectors	84
Figure 3.14 Employment share of public enterprises in Italy and the EC by main branches, percentage shares in 1987	92
Figure 3.15 R&D expenditure as a percentage of GDP	95
Figure 4.1 Growing Japanese Import Penetration of US machine-tool market (in % of annual US machine-tools consumption)	116
Figure 4.2 Rising World Production and Trade of machine-tools, 1964-1990	118
Figure 4.3 Production of CNCs as a percentage of total production of machine-tools	119
Figure 4.4 Representation of the change in the degree of novelty of the machine-tool sector	121
Figure 4.5 External sources of technology for machine-tool firms	123
Figure 4.6 Outlays by financial institutions to small and large Japanese firms, 1966	138
Figure 5.1 The organisational chart of the firm is shown below	141
Figure 5.2 The process of innovation	142
Figure 6.1 Fully integrated process of steel production	154

Figure 6.2 Diagram of a traditional, integrated steel mill	155
Figure 6.3 Production of steel in a minimill	157
Figure 6.4 Danieli Group: Net income and Sales Revenue in billion lira	163
Figure 6.5 Internal organisation of the Holding	166
Figure 6.6 Liquidity ratio	169
Figure 6.7 The R&D unit	172
Figure 6.8 Flows of information and funds	173
Figure 7.1 Top ten machine-tool manufacturing countries in 1998 (million US dollars)	192
Figure 7.2 Italy's share of world machine-tool production	192
Figure 7.3 Production of machine-tools for the four world main producers (million of US dollars)	195
Figure 7.4 Italian machine-tool industry: breakdown by employee groups. 1997	197
Figure 7.5 Distribution of firms among independent firms and groups of firms	199
Figure 7.6 Sales channels on the market of CNCs (1997)	209
Figure 7.7 Types of innovation in the machine-tool sector	217
Figure 7.8 Use of external financing for innovation	220
Figure 7.9 Type of control	223

## LIST OF TABLES

Table 1.1 Corporate governance systems	21
Table 1.2 Summary of the possible cases	23
Table 1.3 Average percentage distribution of innovation costs of Italian innovating firms by item	23
Table 1.4 Distribution of R&D activity in 1985, UK	25
Table 1.5 Inventions that would not have been developed in the absence of patent protection (%)	27
Table 2.1 Interviews with the top management and majority shareholders	44
Table 2.2 Interviews with middle managers	46
Table 2.3 Interviews	48
Table 3.1 Managing units (%)	58

Table 3.2 Direct ownership of listed companies in major industrial countries	59
Table 3.3 Percentage of shares owned by controlling agent in manufacturing companies	61
Table 3.4 Average number of lenders per non-financial firm	65
Table 3.5 Commercial bank loans to non-banks according to type of contract	66
Table 3.6 When do banks learn of ownership changes at borrowing firms?	66
Table 3.7 Commercial bank collateralisation of loans	67
Table 3.8 Number of Listed Companies by Country, capitalisation at the end of 2000, and newly listed companies in 1999	72
Table 3.9 Main Indicators (Main market -figures in billion of lire)	73
Table 3.10 The European markets for small and medium firms in 1999	80
Table 3.11 Degree of separation between ownership and control	82
Table 3.12 Human resources management	100
Table 3.13 Share of high technology products on total exports	106
Table 4.1 Ratio Export/ Production	115
Table 4.2 Shares of machine-tools production in some producing nations 1975-1987	116
Table 4.3 Evolution of machine-tools production in the first ten manufacturing countries in the world (million US dollars)	117
Table 4.4 Sources of information for innovation	124
Table 4.5 Methods of maintaining or increasing the competitiveness of product or process innovation	126
Table 4.6 Summary of the characteristics of the sector and of the requirements in terms of corporate governance	128
Table 5.1 Italian machine-tool industry: number of plants by sales groups and by employee groups, 1997	140
Table 7.1 Competitiveness indicator of the Italian machine-tool industry (1980=100 Italian lira)	194
Table 7.2 Percentage share of the first three shareholders	198
Table 7.3 Existence of family links among the first three shareholders (when there is more than one shareholder)	198
Table 7.4 Type of majority shareholder	199
Table 7.5 Forms of financing innovation 1992-1994	200
Table 7.6 Degree of understanding of the machine-tool sector by Italian banks	201

Table 7.7 Ranking of the “lack of appropriate sources of finance” as a factor hampering innovation (1=most important)	202
Table 7.8 Is your main priority to maximise shareholders’ value, if necessary at the expense of the interests of other stakeholders?	207
Table 7.9 Type of relationship with the customers	207
Table 7.10 Type of relationship with the suppliers (not of CNC)	208
Table 7.11 Type of relationship with the suppliers (CNC)	209
Table 7.12 If it seemed to the top management that the firm could gain in profit over the next three years by a strategy which involved dismissing a substantial number of employees, which of the following considerations would weigh against this, and how strongly?	210
Table 7.13 What is the role played by the educational system in preparing the students to work in the machine-tool sector?	211
Table 7.14 With respect to (1) Change in processes, (2) Product Innovation, how would you describe the attitude of manual production employees?	212
Table 7.15 Scale	217
Table 7.16 Product innovation in groups and independent firms	218
Table 7.17 Summary statistics: machine-tool producers	218
Table 7.18 Degree of autonomy from the Holding in R&D activities	219
Table 7.19 R&D intensity in 1992 (R&D expenditure /sales)	219
Table 7.20 R&D intensity (R&D expenditure/sales) in 1992	220
Table 7.21 Shareholders’ type	222
Table 7.22 Descriptive statistics for FAM and AGREEMENT	223
Table 7.23 Descriptive statistics	224
Table 7.24 Probit for full sample	225
Table 7.25 Probit for reduced sample	227

## ACKNOWLEDGMENTS

I would like to express my thanks to the following, for their support, useful comments and encouragement during the drafting of this thesis:

- to Professor Gavin C. Reid of the Department of Economics, University of St. Andrews, as supervisor;
- to Professor Andrew Tylecote, Management Department, University of Sheffield, as coordinator of the COPI project;
- to my parents (Armando and Angela);
- to Derek Corcoran, Marian Tupy, Helen Paul and Dr. Laurence Lasselle.

## **Introduction**

*Product innovation is one of the main driving forces of any economic system. Recognizing that innovation is not an exogenous phenomenon and that firms play an active role in the innovation process has been a fundamental achievement over the past century. Unfortunately, an agreement on which firms' characteristics determine their innovativeness has yet to be reached. Scale, level of R&D, cash flow, and diversification are all factors that have been studied for decades without obtaining any definite result.*

*In the last ten years a new approach for the study of innovation has emerged. Such an approach, known as the Systems of Innovation approach, stresses that firms do not innovate in isolation but in conjunction with other actors. Studying the characteristics of firms is therefore not sufficient to uncover the main determinants of innovation. The focus needs to be widened so as to comprise both the firm and all the other actors that are part of the system and that interact with the firm in the process of innovation. National, regional and technological systems are now being investigated, both with a holistic approach and with a focus on one or few elements of the system, such as the financial system, the public sector, the educational system and so on.*

*Very recently, it has been suggested that the system of corporate governance might be one of the most distinguishing features of a System of Innovation. The idea is that the system of corporate governance influences the amount of resources being spent on innovation and the type and extent of the incentives given to those who can contribute to the innovation process. This hypothesis is currently being investigated in Europe by two teams of researchers from various European countries. The first team,<sup>1</sup> of which the author of this thesis is part, is co-ordinated by Prof. Andrew Tylecote from the University of Sheffield. The project and the relative framework are known as the COPI (CORporate governance and Product Innovation) project. The second team,*

---

<sup>1</sup> The team members are: Prof. Andrew Tylecote and Mrs. Paulina Ramirez (University of Sheffield); Prof. Tom Groot and Mrs. Denise Go-Feij (Vrije University, The Netherlands); Prof. Reinhart Schmidt and Miss Birgit Maczulaitis (Martin-Luther University, Germany); Prof. Diana Grosse and Miss Dana Fritsch (LS ABWL, Germany); Prof. Pierre Garrouste and Miss Marianne Guyot (GATE -Groupe d'Analyse et de Theorie Economique, France); Prof. Sergio Albertini (University of Udine, Italy); Prof. Sten Jonsson, Dr. Gert Sandahl and Mr Zia Mansouri (Gothenburg School of Economics and Commercial Law, Sweden).

*with a different framework, is co-ordinated by Prof. William Lazonick from INSEAD in France.*

*This thesis employs the COPI framework to study the influence of corporate governance on product innovation in the machine-tool sector in Italy. The choice of country is linked to the nationality of the author and to her specialisation. The choice of the sector was dictated by its strategic importance within any economy. Machine tools are, in fact, essential in the production of any type of innovative machinery, which is very often a significant part of the expenditures that a firm supports for innovation. Firms that belong to countries with a strong and innovative machine-tool sector can utilise an important source of competitive advantage (the innovative machinery) one or two years before their foreign competitors. Understanding what factors favour innovation in the machine-tool sector has therefore a great importance for the economy of a country, as a whole, not only for the sector itself.*

*As explained in Chapter 1, according to the COPI framework, not one of the systems of corporate governance is the “one best way”. Each system presents its advantages and disadvantages according to the industrial sector under consideration. Such differences would explain the different industrial specialisation of different countries. According to the framework, insider systems should perform better in sectors characterised by incremental innovation, a low degree of appropriability of the returns on investments and a low degree of visibility (i.e. sectors where the type of information that flows within firms and towards the markets can be incomplete and misleading). Outsider systems, on the contrary, should perform better in sectors characterised by radical types of innovation, a high degree of appropriability of the returns on investments and a high degree of visibility (i.e. where the flows of information are more exhaustive).*

*Chapter 2 contains an explanation of the method employed in the thesis. In Chapter 3 we study the main characteristics of the Italian system of corporate governance, trying to categorise it either as insider or outsider. We study the structure of ownership and control, the capital market, the public sector, the labour relations' system and the market structure. We also critically assess the recent major developments in terms of the capital markets, venture capital market, code of conduct for listed firms and so on. A significant transformation of the corporate governance system can in fact seriously undermine the competitive advantages of a country's industry, leading to a stalemate.*

*According to the framework, it is the technology employed in a particular industry that determines what system of corporate governance better delivers innovation in that industry. Accordingly in Chapter 4 we analyse the machine-tool sector in order to identify its main characteristics and to highlight the main requirements in terms of corporate governance. We also employ the COPI framework to try and give an explanation for the decline of the US in the machine-tool sector during the 1970s and 1980s and for the upsurge of Japan.*

*Chapters 5, 6 and 7 are dedicated to the machine-tool sector in Italy. Chapters 5 and 6 contain two case studies. The first case study is about an Italian independent family-business of a medium scale with its seat in the Veneto region. The second case study is about a group of firms with subsidiaries both in Italy and abroad and with Headquarters listed on the stock exchange. The case study also contains a comparison between the Italian Headquarters and a Swedish subsidiary, with a particular focus on the differences in corporate governance. These two case studies help to uncover those issues that demand the most attention and that form the basis of the study of the machine-tool sector in Italy, which is dealt with in Chapter 7.*

*The study uses the COPI framework to point out the strengths and weaknesses of the corporate governance system in the System of Innovation of machine-tool builders. In addition, it addresses a specific problem, which is whether machine-tool builders should merge or become part of groups of firms in order to enhance their ability to innovate. This latter possibility has been put forward by UCIMU (the Italian association of machine tool builders) as the only way Italian builders can maintain their competitiveness and market share. As mentioned above there is not unanimous consensus on whether the scale of a firm has any influence on its degree of innovativeness. At the end of Chapter 7 an econometric analysis is employed in testing whether large firms or groups of firms in this sector have a higher probability of innovating. Conclusions and policy propositions follow at the end.*

## 1. Corporate governance and product innovation: a review of the literature

*“I think there is a world market for maybe five computers.”*

Thomas Watson, chairman of IBM, 1943.

*“But what....is it good for?”*

Engineer at the Advanced Computing Systems Division of IBM, 1968,  
commenting on the microchip.

*“Who the hell wants to hear actors talk?”*

H.M. Warner, Warner Brothers, 1927.

*“Heavier-than-air flying machines are impossible.”*

Lord Kelvin, president, Royal Society, 1895.

*“Drill for oil? You mean drill into the ground to try and find oil? You’re  
crazy.”*

Drillers to whom Edwin L Drake tried to enlist for his project to drill for oil  
in 1859.

*“Everything that can be invented has been invented.”*

Charles H. Duel, Commissioner, U.S. Office of Patents, 1899.

## 1.1 Introduction

These few quotes refer to some of the most spectacular innovations of the last 150 years or so: the audio system for cinema; the plane; the microchip; the personal computer and the idea of drilling into the ground for oil. However, the generation of an innovative product is not automatic and, as we can learn from the quotes above, very often, those who have a good understanding of a sector might not see the revolutionary content of a new idea.

Innovation is one of the most fundamental components of a capitalist economy and achieving the appropriate level and most effective way of spending in projects that present the highest potentiality for success is essential to sustained economic development. What are then the best conditions to fulfill this goal? What should the characteristics of those who are in control be to ensure that the allocation of resources follows the correct path? What type of information is needed by the financiers of innovation to understand the potentialities of the investment projects they are asked to finance? What is the best structure of incentives for managers and employees to obtain their maximum participation in the innovation process? To whom are the returns of investment to be allocated?

These and other questions will be answered in Section 1.5. There we<sup>1</sup> will introduce the theoretical framework that will be used in the next chapters of this thesis to study the Italian system of corporate governance and its role in the innovation process within the machine-tool sector. Before proceeding with the description of the theoretical framework, however, we will offer a short summary of the state of the art on this topic, namely corporate governance and product innovation. As the two topics have never been studied together before, we will need to present both the summary of the state of the art of innovation (Section 1.2) and that of corporate governance (Section 1.3). In Section 1.4, we will offer a description of the various systems of corporate governance and discuss their distinguishing characteristics. Finally, in Section 1.6, we will present a comparison of the theoretical framework used in this thesis with the theoretical framework suggested by

---

<sup>1</sup> The use of the first person plural might be misleading as the author is part of the COPI project. However, unless clearly specified, this thesis is entirely the result of the author's work.

Prof. Lazonick, the coordinator of the parallel European project on the influence of corporate governance on product innovation.

## **1.2 Innovation, innovating firm and systems of innovation**

Innovation is the driving force of modern capitalism. Understanding and explaining the process of innovation is therefore vital. It is also a very complex and articulated problem that needs to be addressed from different angles and at different levels of analysis. Since the works of Joseph Schumpeter (1939, 1942), a multitude of theories on innovation have been produced, not only within economics and management, but also within many other disciplines. A thorough review of the literature on innovation is therefore a very challenging task that goes beyond the scope of this work. In this section we will therefore concentrate only on those approaches to the study of innovation that, we think, can help to better understand the theoretical framework employed later in this thesis.

Studies on innovation can be classified according to the level of analysis employed, whether it is the innovation itself, the innovating firm or the overall system of innovation.

The traditional categorization of innovations distinguishes between incremental, radical, architectural and component innovations. In addition, it is possible to distinguish between competence-enhancing and competence destroying innovations. Incremental innovations introduce relatively minor changes to existing products, utilise the potential of an established design and often reinforce the strengths of established firms. For these reasons, incremental innovations are usually considered as competence-enhancing innovations (Tushman and Anderson, 1986) as they build on the core competences (Abernathy and Clark, 1985) of the firm. Radical innovations, on the contrary, are based on different scientific principles and are generally competence-destroying, that is, they destroy the usefulness of the existing capabilities of the firm. According to Tushman and Anderson (1997), progress is the result of a succession of radical and incremental innovations along so called "technology cycles". The latter start with a radical innovation, or technological discontinuity. This event is followed by an era of substitution, during which the new technology progressively displaces the previous one, and an era of design competition, during which several designs based on the new technology exist

simultaneously. The competition culminates in the appearance of a dominant design, which becomes accepted as a standard. Following this is an era of incremental change, during which the dominant design is progressively extended and improved (Abernathy and Utterback, 1978) and competition is based on market segmentation and efficiency. The cycle then starts again with a new technological discontinuity.

The literature distinguishes also between architectural and component innovation (Tushman and Anderson, 1986; Henderson and Clark, 1990). This distinction arises from the consideration that any product is composed of a series of components and of an architectural design that brings all the components together to form a system. "Successful product development requires two types of knowledge. First it requires component knowledge, or knowledge about each of the core design concepts and the way in which they are implemented in a particular component. Second it requires architectural knowledge or knowledge about the ways in which the components are integrated and linked together into a coherent whole." (Henderson and Clark, 1990, p.3). It follows that component innovations are innovations that involve one or more components of a product and leave its architectural design untouched. As for architectural innovations, Henderson and Clark (1990, p.9) define them as a modification in "the way in which the components of a product are linked together, while leaving the core design concepts (and thus the basic knowledge underlying the components) untouched [...]. This kind of innovation [...] destroys the usefulness of a firm's architectural knowledge but preserves the usefulness of its knowledge about the product's components." Architectural innovations can cause serious problems to firms as they are subtle and difficult to recognise and firms very often try to deal with them relying on their existing knowledge. On the contrary, this type of innovation requires a different type of architectural knowledge, usually accumulated through a different learning path and, therefore, a different organisational architecture. In other words, architectural innovations are often competence-destroying and require important modifications in the learning process of firms, which takes time and large investments of resources.

Other approaches within the literature on innovation focus on the innovating firm (Metcalf, 2000) and, more specifically, on the availability of resources to invest in innovation, on the incentives to make such investments, on the core competences of the firm and their effect on innovation and on the capabilities managers need to manage the process of innovation.

Studies that analyse the relationship between R&D expenditure and firm characteristics, such as firm size (see Nelson et al., 1967; Bound et al., 1984; Cohen et al., 1987), business unit size (see Cohen et al., 1987), cash flow (see for example Mueller, 1967; Teece and Armour, 1977) and degree of diversification (Nelson, 1959; Scherer, 1965; Grabowski, 1968), belong to the first group.

Studies that concentrate on the appropriability conditions belong to the second group. As argued by Cohen and Levin (1989, p.226): “to the extent that new knowledge is transmitted at relatively low cost from its creator to prospective competitors, and particularly to the extent that such knowledge is embodied in new processes and products that may be copied or imitated at relatively low cost, appropriable rewards may be insufficient to justify innovative effort”. This group of studies (see Mansfield, 1986; Levin et al., 1987) show inter-industry differences in the appropriability conditions due to a difference in the effectiveness of patents. They also show that when patents are not effective, firms tend to rely on other means of protection, such as complementary assets, marketing, customer service, complexity of the product and secrecy.

As for the competences of a firm, in line with the literature on the characteristics of innovation discussed above, it has been argued that whereas the core competences of a firm are one of its main sources of competitive advantage (Prahalad and Hamel, 1990) they simultaneously enhance and inhibit development (Leonard-Barton, 1992). “Core competences need not become core rigidities” (Tushman and Anderson, 1997, p.3). Innovations, in fact, necessarily require some degree of creative destruction (Schumpeter, 1942) and especially when they are radical or architectural, they require continuous organisational renewal. It is often said that managing a firm through a process of renewal of this type is more difficult than managing it through a recession, as it breaks political equilibria, embedded competences, cultures and organisational processes. The fourth group of studies, therefore, suggests paths that managers could follow to bring their firms from strength to strength, through processes of continuous change. For example they stress the importance of a deep analysis of existing formal structures and of obtaining the cooperation of the employees (Bird and Jelinek, 1990), of leveraging on existing core competences (Prahalad, 1993) and of models of congruence (Nadler and Tushman, 1997).

Finally, a new approach to the study of innovation calls the attention to the fact that “firms almost never innovate in isolation. In the pursuit of innovation they interact with other organisations to gain, develop and exchange various kinds of knowledge, information, and other resources. These organisations might be other firms (suppliers, customers and other resources) but also universities, research institutes, investment banks, schools, government ministries, etc. Through their innovative activities, firms often establish relations with each other and other kinds of organisations; therefore it does not make sense to regard innovating firms as isolated, individual decision-making units” (Edquist, 1997, p.2). This new approach is known as the Systems of Innovation approach, and it forms the basis of the theoretical framework employed in this thesis. Drawing in large part from the evolutionary theories of Nelson and Winter (1977, 1982), knowledge is put at the centre of the attention and it is for this reason that the understanding of the process of knowledge formation, (i.e. learning), is a fundamental part of this approach. This process, as argued by Lundvall (1992, p.1),<sup>2</sup> “is predominantly an interactive and therefore socially embedded process which cannot be understood without taking into consideration its institutional and cultural context”. The problem is where to lay the borders of the context. Some authors believe that the focus should be on a national basis. This is for several reasons ranging from market and natural resource determinants (similar resource base and similar revenues and consumer tastes); to the fact that user-producer collaborations and most of the other types of informal collaborations occur more frequently within the national economy than on an international level; to the fact that technically-based interdependences are more likely to occur within national economies and finally to the role played by the State in the direction and rhythm of technological innovation (Niosi, *et al.* 1993).

Two of the most important and earliest works that adopt the systemic approach, namely Lundvall’s (1992) *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning* and Nelson’s (1993) *National*

---

<sup>2</sup> “According to this author’s recollections, the first person to use the expression ‘National System of Innovation’ was Bengt-Åke Lundvall and he is also the editor of a highly original and thought-provoking book (1992) on this subject. However, as he and his colleagues would be first to agree (and as Lundvall himself points out) the idea actually goes back at least to Friederich List’s conception of ‘The National System of Political Economy’ (1841), which might just as well have been called ‘The National System of Innovation’” (Freeman, 1995, p.5).

*Systems of Innovation: A Comparative Study*, even if in a different way,<sup>3</sup> put the boundaries of the system at the national level. Other authors place a major emphasis on *regional systems of innovation*, where regions might cross the national borders or be part of a wider national system. For example Hans-Joachim Braczyk, *et al.* (1998), trace the history and the structural characteristics of fourteen regional systems of innovation.

Both of these approaches, however, embrace all the industries existing in a specific country or region and do not take into consideration the possible variations among industries. The so-called Technological Systems of Innovation (TS) approach, instead, defines a system as “a dynamic network of agents interacting in a specific economic/industrial area under a particular institutional infrastructure and involved in the generation, diffusion, and utilisation of technology” (Carlsson and Stankiewicz, 1991, p.93). Their focus is therefore on innovations in specific technological systems, which differ for economic competences, networks of entrepreneurs and institutional infrastructures. In line with this approach, but with some differences, is the Sectoral System of Innovation (SIS) approach by Breschi and Malerba (1997). According to these authors a SIS “is composed of those firms that are active in developing and making a sector’s products and in generating and utilising a sector’s technologies; such a system of firms is related in two different ways: through processes of interaction and cooperation in artefact-technology development and through processes of competition and selection in innovative and market activities” (ibid., 1997, p.131). Using the authors’ words, “the perspective offered by SIS is different from the TS notion. While the concept of TS looks at networks of vertically integrated as well as horizontally connected agents and organisations engaged in the development of specific technologies, the concept of SIS focuses on competitive relationships among firms by explicitly considering the role of selection environment” (ibid., 1997, p.131). Breschi and Malerba do not deny the importance of institutions but their centre of attention is the firm and its relationship with other firms.

---

<sup>3</sup> Nelson’s book focuses mainly on different national R&D systems, whereas Lundvall’s book adopts a more theoretical approach and each chapter is dedicated to a different aspect of the national system of innovation approach, including the relationship between producers and consumers, the financial system and so on.

The theoretical framework that will be used in this thesis was first put forward by Tylecote and Conesa (1999), in “Corporate Governance, Innovation Systems and Industrial Performance”. It can be defined as a “National-Technological System of Innovation” as it distinguishes both between nations and between industries that employ different technologies. In addition, even if it adopts a systemic approach, and tries to point out the main elements influencing innovation for each sector (user-producer relationships, flows of information, institutions, educational system and so on), it tends to focus on a particular distinguishing aspect of each country, namely their system of corporate governance. This is a new line of study within the National Systems of Innovation approach<sup>4</sup> and it is not certainly reductive since, as Edquist (1997) argues, focusing on a single aspect of the system is often necessary. “A system of innovation should be looked upon as a ‘whole’ because many of its elements are – more or less closely- related to each other- otherwise, there would be no ‘system’. But it is also sometimes necessary to deal only with parts of the system – one at a time or a few in relation to each other. Hence, it may sometimes be necessary to restrict the analysis to various subsystems of a system of innovation. To divide the complex ‘whole’ into pieces [...] it is sometimes useful – and sometimes even a necessary way of understanding and creating theories about the relations between various parts or ‘elements’ involved in the process of technological and organisational change. In other words, a study limited to, for example, the financing of innovation is not necessarily reductionism” (ibid., 1995, p.18).

Before focusing on the framework, in the next few sections we will offer some background on the state of the art of corporate governance.

### **1.3 Theories of corporate governance**

Since the classical work by Adolph Berle and Gardiner Means (1932), *The Modern Corporation and Private Property*, studies on corporate governance have dealt with ways of aligning the interests of a self-interested management and weak and dispersed shareholders. Berle and Means, in fact, draw attention to the prevalence of widely held corporations in the US, which are characterised by a

---

<sup>4</sup> The only other author that studies systems of corporate governance and innovation is Lazonick (1998). See also Soskice (1997) for a similar approach.

separation between ownership and control. They pointed out that by the end of 1929, an identifiable individual or compact group of individuals held a majority of the equity in as few as 11% of the 200 largest industrial corporations. For about half the companies, the dispersion of ownership was so high that the managements of these companies were said to have total control over them and were not held accountable to any particular owner or other stakeholder. With respect to such evidence, studies on corporate governance have tried to answer three main questions: "How do the suppliers of finance get managers to return some of the profits to them? How do they make sure that managers do not steal the capital they supply, or invest it in bad projects? How do suppliers of finance control managers?" (Shleifer and Vishny, 1997, p.737). These questions are intrinsic to the so-called contractual view of the firm.<sup>5</sup> The financiers rely on the managers' specialized human capital to obtain returns on their funds and the managers need the financiers' funds to make investments in the firm. The two groups of individuals sign a contract that indicates what the managers can do with the funds and how the returns to the investments are to be divided between the two groups.

However, as most future contingencies are too difficult to describe and foresee, complete contracts are "technologically unfeasible" (ibid., 1997, p.741). Those rights not indicated in the contract are defined as *residual rights* and in a large publicly held corporation, the residual control rights and the residual income rights are usually unbundled. The management is assigned the first group of rights and the shareholders the second group. Having the residual income rights means that the shareholders are the residual claimants or, in other words, that they get what is left after all the expenses are paid. Therefore, maximising their return is the same as maximising the total wealth created by the firm.<sup>6</sup> Managers are therefore supposed to use their residual control rights to allocate resources to those investments that maximise the return to the shareholders. This approach is defined as the financial perspective of corporate governance.

Empirical evidence suggests that managers tend to pursue their own interests instead of those of the shareholders and companies and, therefore, very often get away with lacklustre performance. The possibility of poor business performance due

---

<sup>5</sup> See Coase (1937), Jensen and Meckling (1976) and Fama and Jensen (1983 a,b).

<sup>6</sup> Other approaches to what the underlying goal of a company should be are presented in the following sections.

to the separation of ownership and control had already been anticipated by Adam Smith in his famous book, *The Wealth of Nations*. There he wrote: "The directors of such companies, however, being the managers rather of other people's money than of their own, it cannot well be expected that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own" (Smith, 1976, p.233). The separation of ownership and control, in fact, gives rise to particular types of costs defined as "agency costs" which comprise both the costs resulting from managers misusing their position and the costs of monitoring and disciplining them. The fundamental problem dealt with in corporate governance debates is concerned with the most effective ways of reducing agency costs and aligning the interests of managers to those of shareholders.

Since the introduction of the "improved management hypothesis" by Manne in 1965, the market for corporate control (often referred to as the takeover market) has been considered a powerful instrument for disciplining managers. For example Herzel and Shepro (1990, p.3) state, "the most compelling argument in favour of hostile takeovers is that they are an important discipline on the managements of likely target companies". According to this hypothesis, takeovers allow the transfer of control from inefficient management teams to more efficient ones and therefore should encourage the alignment of interests between managers and shareholders. Managers are in fact threatened by the possibility of a takeover and this keeps them from abusing their power or misusing company resources. When a management team is not successful or does not pursue the maximisation of the shareholders' value, the stock price of their firm falls, reflecting the mismanagement. This attracts buyers who acquire the firm to change the managers and correct the abuses. The empirical evidence, however, does not seem to support this view. In 1996 Franks and Mayer examined the relationship between hostile takeovers, dismissal of management and poor prior performance. Even if they found evidence of high board turnover and restructuring after the takeovers, they found very little evidence of poor performance prior to bids and "reject the view that hostile takeovers perform a disciplinary role" (ibid., 1996, p.164).

The attention has also been focused on the role played by the board of directors as disciplining mechanism. "In principle, the board of directors is the single most important corporate governance mechanism" (Blair, 1995, p.77). In the US and in the UK this body is very powerful, having the right of hiring and firing the

executive directors and of performing numerous functions. There are, however, quite a number of factors that hinder the effectiveness of this body as a monitoring and disciplining device. First, it does not appear to have a sufficient degree of independence, as, very frequently, (at least in the US) the CEO serves as the chairman, and board members other than the chairman are part of the management team.<sup>7</sup> Second, “even if shareholders elect the board, directors need not necessarily represent their interests” (Shleifer and Vishny, 1997, p.751). In fact, it is usually very difficult for the shareholders to remove a board member and to vote for somebody other than those suggested by the directors themselves (which basically means by the management). For these reasons, much of the debate is centred on questions about the best composition of the board, the rules of its functioning and the interests it should serve to transform it into an effective and independent monitoring and disciplining instrument.<sup>8</sup> One widely accepted proposal is to include a majority of outside directors on the boards. It appears that the presence of non-executive directors on the board favours the replacement of inefficient managers (Franks, Mayer and Renneboog, 1996). “Performance measures are more highly correlated with CEO turnover for firms in which outsiders dominate the boards of directors than for firms in which insiders dominate. Outsider-dominated boards tend to add to firm value through CEO changes” (Weisbach, 1988, p.458). In the US, proposals of reform of the board of directors also include a reduction in its size and the establishment of special committees that should allow the directors to specialise in specific areas and to be able to take effective decisions.<sup>9</sup>

As mentioned above, when the shares are highly dispersed, there is little incentive for each minority shareholder to exercise control and *exit* appears to be the cheapest option. This free-rider problem can be mitigated by the presence of large shareholders. “When control rights are concentrated in the hands of a small number of investors with a collectively large cash flow stake, concerted action by investors is much easier than when control rights, such as votes are split among many of them. [...] A substantial minority shareholder has the incentive to collect information and monitor the management thereby avoiding the traditional free-rider problem. He also has enough voting control to put pressure on the management in some cases or

---

<sup>7</sup> See Mace (1971) and Jensen (1993).

<sup>8</sup> See for example Weisbach (1988), Fama (1980) and the Cadbury Committee (1992).

<sup>9</sup> See Blair (1995, p. 77-82).

perhaps even to oust the management through a proxy fight or a takeover” (Shleifer and Vishny, 1997, p.753-754). At the same time, however, there is also evidence that the presence of large shareholders bears consistent costs. Shleifer and Vishny (1997) indicate two main types of costs arising from the presence of a large shareholder. Firstly, large shareholders are not diversified and as a consequence bear excessive risk. Secondly, while using their control rights to maximise their own welfare, large shareholders can redistribute wealth from other shareholders and stakeholders. Such expropriation can take several forms. For example it can be a straightforward expropriation, when the large shareholder treats himself preferentially at the expense of the other stakeholders. It can also have direct negative effects on the performance of the firm, when it negatively influences the incentives of managers and employees to invest in their human capital or when it hinders the possibility of rising external sources of finance.

Consistent with this view, several studies not only show that in some countries (those where there is a lower legal protection of the minority shareholders) shares with superior voting rights trade at a much higher price,<sup>10</sup> but also that concentration of ownership has a positive effect on the profitability of firms only up to a certain level.<sup>11</sup> Shleifer and Vishny (1997, p.759) interpret the latter phenomenon as follows: “Consistent with the role of incentives in reducing agency costs, performance improves with higher manager and large shareholder ownership at first. However, as ownership gets beyond a certain point, the large owners gain nearly full control and are wealthy enough to prefer to use firms to generate private benefits of control that are not shared by minority shareholders”.

The debate about the role played by large shareholders in the corporate governance of firms has become much more lively in the last decade. This is mainly because a rapidly increasing body of studies<sup>12</sup> shows clearly that companies with a widely dispersed ownership are very rare in most countries and that a large majority of firms in the world, even when listed, have a dominant owner. For example, La Porta, *et al.* (1998b) studying the 20 largest traded companies in 27 different countries conclude that considering “the Berle and Means corporation as the

---

<sup>10</sup> See for example Zingales (1994) for Italy.

<sup>11</sup> See Mork *et al.* (1988), Stulz (1988) and Wruck (1989).

<sup>12</sup> See for example Eisenberg (1976), Demsetz (1983), Demsetz and Lehn (1985), Shleifer and Vishny (1986). Country specific studies are those by Franks and Mayer (1994) for Germany; Berglöf and Perotti (1994) for Japan; Barca (1995) for Italy and La Porta, *et al.* (1998b) for developing countries.

dominant ownership structure in the world is misleading” (ibid., p.19). Instead, controlling shareholders –usually the State or families- are present in most large companies, not only as shareholders with strong control rights but also as managers. For this reason, they argue, the “theory of corporate finance relevant for most countries should focus on the incentives and capabilities of controlling shareholders with large equity stakes to pursue strategies that benefit them at the expense of the minority shareholders. Unlike the case of managers with limited ownership interests, the problem of expropriation of minorities becomes much more central than that of empire building” (ibid., 1998b, p.6).

Another question on the agenda of the corporate governance debate, especially in the US, is that of finding what type of large shareholder would best solve the myopia problems that according to some authors appear to affect the long-term investment capacity of American firms. Those who sustain this idea argue that for several reasons, American managers are encouraged to focus on short-term performance, and, as a consequence, often sacrifice the long-term performance.<sup>13</sup> Among the reasons there are: the high cost of capital, which shortens the time horizons for investment;<sup>14</sup> the trading activities of portfolio managers, who are mainly rewarded on a quarterly basis for their performance; and the fact that portfolio managers do not have the time or resources to learn the details about the investment programs of hundreds of companies and therefore they make judgments on the basis of measures of synthesis.

According to those who adopt this approach, institutional investors and pension funds in particular could “fix the governance system” (Blair, 1995, p.145). Until the late 1980s, the idea was that the most evolved financial and corporate governance system was the American one, with its fragmented financial institutions, liquid markets and highly regulated disclosure of information. All the other systems were expected to converge sooner or later to this highly efficient system. At the beginning of the 1990s, increasing evidence had shown that Japan and Germany had set up systems of corporate governance that could spur investments and create wealth as well as or even better than the American one. In particular, it seemed that an essential difference was the presence, in those countries, of powerful financial

---

<sup>13</sup> See Blair (1995) for a survey on the market myopia hypothesis. See Demirag (1998) for a series of contributions on short-termism in various countries.

<sup>14</sup> See Jacobs (1991).

institutions able to perform a critical governance function that appeared to be missing in the American system.<sup>15</sup> The idea that a “relationship type of investing”,<sup>16</sup> would solve some of the corporate governance problems and the business myopia in the US has progressively become more widespread in the last 5 to 8 years. In particular, it seems that pension funds would be the best partners for a long-term relationship. As reported by Blair (1995), these financial institutions differ in several ways from the Wall Street money managers. Firstly they have predictable inflows and outflows, which means that liquidity is not as important for them. Secondly, some of the pension funds have become so large that they cannot easily buy and sell large stakes in individual companies without the risk of destabilising the market. Finally, as their portfolios are very diversified they are likely to have shares in both sides involved in a transaction and therefore would oppose transactions that did not create an overall positive value.

Notwithstanding the differences between the financial and the business myopia perspectives, it is possible to find a common denominator, namely the belief that the firm has to be run in order to maximise shareholders’ value. There is, however, a different perspective according to which the firm has responsibilities also towards other stakeholders. This approach, usually referred to as *stakeholder* perspective, takes several forms. Some authors<sup>17</sup> propose that it is in the interests of the shareholders to take into account the interests of the other stakeholders in the firms as this would enhance their own wealth. Other authors argue: “the interests of the stakeholders are of intrinsic value. That is, each group of stakeholders merits consideration for its own sake and not merely because of its ability to further the interests of some other group, such as the shareowners” (Donaldson and Preston, 1995, p.67). According to this perspective, all the persons or groups who participate in an enterprise do so to obtain some benefits and none of these stakeholders have *prima facie* priority over the others. But in illustrating their model they also add: “all the stakeholder relationships are depicted in the same size and shape and are equidistant from the ‘black box’ of the firm in the centre” (ibid., 1995, p.68). This

---

<sup>15</sup> See next section for a thorough description of the differences between the *insider* and *outsider* systems.

<sup>16</sup> That is “a situation in which the investing institution is responsibly engaged in overseeing the management of the company, rather than remaining detached or passive, and is committed to the ‘long term’” (Blair, 1995, p. 172).

<sup>17</sup> See for example Clarkson (1994).

statement indicates how the sustainers of the stakeholder perspective (as much as those of the financial perspective) are totally concerned on how the returns to investment have to be divided between various constituencies but do not pay any attention to how the system of corporate governance actually influences the functioning of the “black box”. A good system of corporate governance, in fact, is the one that ensures that the available funds are invested in the best possible way so as to maximise the overall wealth. A good system of corporate governance is one that is generated once the “black box” has been opened, and once the functioning of firms has been understood. It is built in order to ensure that those who could better enhance the total wealth of a firm have the proper incentives to do so.

A step in this direction was taken for the first time by Blair in her book *Ownership and Control: Rethinking Corporate Governance for the Twenty-First Century* (1995), and even better in her book *Wealth Creation and Wealth Sharing* (1996). In these two books, the author calls attention to the fact that other stakeholders, apart from the shareholders, bear some risk in being part of a firm. The author argues that the employees invest in specific human capital that cannot be fruitfully employed in another firm. Such investment would be largely lost in case of dismissal or if the firm shuts down. “By firm-specific human capital we mean skills or knowledge or networks of personal relationships that are specialised to a given enterprise and are more valuable in that enterprise than they would be in alternative uses. Unlike generic human capital skills that I could take with me to another job or another firm, firm-specific human capital comprises skills that we have or routines or relationships that have developed that are of much less value outside the service of a particular employer” (Blair, 1996, p.8). It has been calculated that, at least in the US, as much as 10 to 15 percent of total compensation of employees represents a reward for firm-specific skills. According to Margaret Blair, that percentage can be considered as a surplus generated by the firm that is being paid to the employees for their bearing a risk in the company. However, this surplus is treated as an economic cost in the current accountancy regime. At the same time, if the company is under financial pressure, the employees can be laid off and lose their investment (as much as the shareholders). “Hence employees with firm-specific skills not only share in the real economic residual of the firm; they also, necessarily, share in the residual risk associated with the firm. If Topel’s estimates are even close, the value of the rents that employees have at risk in the typical large corporation is, in the aggregate,

roughly the same order of magnitude as the value of the stake that shareholders have”<sup>18</sup> (ibid., 1996, p.11). Therefore “under prevailing labour relations practices in this country, maximising share value is a dangerously incomplete performance standard for corporations. [...] Because of this, we believe management and directors should focus on maximising the total wealth-creating potential of the firm, not just on maximising the value of the stake held by shareholders” (ibid., 1996, p.13). If this is not understood, one thing that could happen, according to Blair, is that “we will find changes going on in which firm-specific human capital is used less because of the contracting problems. When we look around at companies and see that they are laying people off and then hiring them back as subcontractors, we can surmise that those companies have decided that former employees’ skills are not firm-specific; they are generic, and they might as well transact their business at arm’s length. They don’t have any particularly compelling reason to be in an employer-employee relationship. This may work fine for some types of tasks. But there may be other tasks where it is really important to build teams of people who develop firm-specific skills and relationships and who are committed to the enterprise. The problem is that, in the effort to achieve efficiencies in the category of tasks that do not require firm-specific skills, we may be undermining the social mechanisms we once had for fostering and protecting firm-specific skills in those tasks where they are still important” (ibid., 1996, p.48). In other words, if the legislation and the accountancy regime are not changed so as to take into account the rents that the employees are putting at risk when they are investing in firm-specific human capital, employees will stop investing in that highly valuable human capital and firms will lose a very important resource, which is essential in order to keep their competitive position.

The contribution by Blair has the advantage to try to look inside the firm and at how the surplus is generated. However, she does not analyse the role played by technological change in contemporary capitalism and the influence of different governance systems on such technological change. This is very well done by Tylecote and Conesa (1999). Adopting a rather broad definition<sup>19</sup> of corporate governance, they suggest that different governance systems present different degrees

---

<sup>18</sup> “Topel reviewed a large sample of workers who had lost their jobs through business closings or layoffs in the mid-1980s and found that, on average, these workers earned about 14 percent less on their next jobs.” (Blair, 1995, p.265).

<sup>19</sup> “Corporate governance is the system by which companies are controlled, directly or indirectly, by shareholders and other stakeholders” (Tylecote and Conesa, 1999, p.25).

of effectiveness in delivering innovations according to the sector in consideration and that these differences help explaining national patterns of sectorial specialisation. According to the authors, industrial sectors differ in the intensity of three main factors characterising innovation, namely *visibility* (how easy is it for someone who is not directly involved in managing the development of a new product or process to judge what resources are being devoted to it and how well they are being spent), *appropriability* (the facility to ensure the returns of an innovation) and *novelty* (measured by the rate of technological change in the sector). Systems of corporate governance appear to differ in their ability to cope with problems arising in connection to these factors.

A thorough description of this theoretical framework will be offered in Section 1.5. However, a good understanding of it requires the knowledge of the main differences among systems of corporate governance. For this reason, Section 1.4 contains a categorisation of the various existing systems of corporate governance, with particular reference to the most famous distinction between outsider- and insider-dominated systems.

#### **1.4 Systems of corporate governance**

The most widely accepted distinction among systems of corporate governance is the one offered by Franks and Mayer (1992) between outsider (or arm's length) and insider (or control-oriented) systems. In the former systems firms are directly controlled by their managers but indirectly controlled through the market for corporate control, by their shareholders, mainly institutions that trade and invest on the Stock Exchange. In the second systems, the ownership tends to be rather concentrated and several subjects other than the shareholders have the power to influence the management of a firm, such as banks, the state, the employees, the customers and so on.

As is shown in Table 1.1, the two systems present numerous other differences. In outsider systems, the degree of concentration of ownership is very low, investors tend to have a portfolio orientation and as a consequence the share of control-oriented finance is low. A large number of firms are listed on the stock exchange, which guarantees a high degree of liquidity. Firms are generally controlled

by their managers and this usually induces agency conflicts between them and the shareholders.

**Table 1.1 Corporate governance systems**

	Type of financial system	
	Control-oriented (insider)	Arm's-length (outsider)
Share of control-oriented finance	High	Low
Financial markets	Small, less liquid	Large, highly liquid
Share of firms listed on exchanges	Small	Large
Ownership of debt and equity	Concentrated	Dispersed
Investor orientation	Control-oriented	Portfolio-oriented
Use of mechanisms for separating control and capital base	Frequent	Limited (often by regulation)
Dominant agency conflict	Controlling vs. minority shareholders	Shareholders vs. management
Role of the board of directors	Limited	Important
Role of hostile takeovers	Very limited	Potentially important

Source: Berglöf (1997).

The market for capital control operating over the public stock exchanges is an essential mechanism for the substitution of inefficient management. The role of the board of directors is very important and the use of mechanisms for separating control and capital base are limited, often by regulation.

On the other hand, in insider systems, ownership is usually rather concentrated in the hands of majority shareholders who play an active role in the control of the firm. As a consequence, financial markets are rather illiquid and hostile takeovers are infrequent. Opportunities for diversification are much lower than in outsider systems and the use of mechanisms for separating ownership from control are very frequent. Conflicts of interest arise between majority and minority shareholders and, especially when the legal system does not properly protect the latter, “in the process of using his control rights to maximise his own welfare, the large investors can redistribute wealth – in both efficient and inefficient ways – from others” (Shleifer and Vishny, 1997, p.758). Finally the number of firms listed on the stock exchange is rather low.

The US and the UK are typical outsider systems whereas all the Continental European countries and the whole of East Asia present an insider type of corporate governance. It is possible, however, to make further distinctions within each of these systems. In fact, even if the US and the UK are both outsider systems, the UK presents a much higher stock market capitalisation relative to national income and

much higher importance of pension funds on the stock market. On the other hand, recalling Tylecote and Conesa (1999), in the US a large fraction of firms are not listed on the stock exchange and, for this reason they can be assumed to have an insider type of control. In addition, a large part of non-listed and newly listed firms are supported by venture capitalists, who usually use their stakes to exercise control over the companies they have invested in.

As for the insider systems, it is possible to further distinguish between them according to the role played by employees, by families and by the state.

Alan Fox (1974) distinguishes between countries with high and low trust industrial relations. Firms in countries belonging to the first group, such as Germany, the Netherlands, the Nordic countries and Japan, regard employees as important stakeholders and take care of their interests in the formulation of their strategies. In the other group of countries, which comprises France and the Mediterranean countries, there are low-trust industrial relations and the state in general intervenes by legislation to safeguard their by interests restricting the right to dismiss.

Also, France and the Mediterranean countries differ in several ways. For example, whereas in the former, one of the most important shareholders is the State, in most of the latter countries and especially in (Northern) Italy firms are held and managed by families with a strong aversion to mergers and the presence of network of firms based on trust.

## **1.5 Corporate governance, innovation systems and industrial performance**

As mentioned in Section 1.2, the theoretical framework adopted in this work is a “National- Technological System of Innovation” type of approach. According to the framework, different industries differ in the degree of *visibility*, *appropriability* and *novelty* of innovation. Systems of corporate governance and financial systems appear to differ in their ability to cope with these characteristics, which, in turn, affects the sectoral specialisation of a country.

The three variables are not novel and they are essentially a combination of existing literature and studies on innovation. In particular, as it will be shown, they draw strongly from the literature on innovation recalled in the first few paragraphs of

Section 1.2. The uniqueness and the novelty of the framework involves considering all these aspects together in relation to the system of corporate governance.

**Table 1.2 Summary of the possible cases**

Requirements in terms of corporate governance	Visibility		Appropriability		Novelty	
	High	Low	High	Low	High	Low
	High firm-specific perceptiveness	Low firm-specific perceptiveness	Shareholders first strategy	Inclusion of the stakeholders	High industry-specific expertise	Low industry-specific expertise

### 1.5.1 The degree of *visibility*

The *visibility* of innovation measures “how easy is it for someone who is not closely involved in managing the development of a new product or process, to judge what resources are being devoted to it and how well they are being spent” (Tylecote and Conesa, 1999, p.25).

**Table 1.3 Average percentage distribution of innovation costs of Italian innovating firms by item**

	R&D	Design, engineering and pre-production developments	Innovative capital goods	Marketing	Acquisition of patents and licences
<i>Supplier dominated</i>					
Clothing	16.5	36.2	27.1	18.9	1.3
Leather and footwear	15.5	17	63.4	2.8	1.3
Wood products	9.7	10.2	78.1	1.3	0.7
<i>Specialised supplier</i>					
Machine-tools	47.6	27.6	22.2	2.1	0.5
Industrial machinery	38.9	31.1	24.8	2.3	2.9
Instruments	54	21.3	21.3	2	1.4
<i>Scale intensive</i>					
Basic industrial chemicals	47.3	6.4	45	0.8	0.5
Domestic appliances	27.2	14.7	54.1	1.1	2.9
Motor vehicles	37.8	4	58.1	0.1	-
<i>Science based</i>					
Pharmaceuticals	66.7	8.7	18	2.1	4.5
Office machinery and computers	64.8	21.7	12.4	1	0.1
Radio, TV and communication equipment	66.1	18.2	13.7	1.2	0.8

Source: ISTAT (1995:Table 11).

The level of *visibility* of an industry is influenced by several factors. A first and important one is the level of spending on physical capital as opposed to low *visibility* activities like production and marketing (See Table 1.3). In fact, as suggested by Tylecote and Conesa (1999) spending on physical capital and, depending on the accounting regime, also some elements of R&D expenditures are capitalised in the accounts and therefore not subtracted from profit. On the other hand, it is much more difficult for someone who is not directly involved in the innovation process to control whether higher expenses in production or marketing are justified or only due to inefficiency.

There are several other factors that deeply influence the *visibility* of innovation, such as the level of centralisation of the innovative activity (which is easier for basic and applied research and more difficult for development); the degree of codifiability of the knowledge involved in the innovation process; the importance of economies of scale and therefore the firms' average size; the distance in space, the hierarchical and cultural distances between those who have direct responsibility for and direct knowledge of the conduct of the process of innovation and those who have control over the provision of finance; finally the distance in time between the expenditures for innovation, the market launch and the financial payoff.

Industries vary greatly in the degree of *visibility* of their innovative activities. In general, industries characterised by more frequent incremental and component innovations present a much lower degree of *visibility*. This is because incremental and component innovations are based on the core capabilities of a firm, which are in large part tacit types of knowledge and, therefore very difficult to assess by an outsider. On the contrary, architectural and radical innovations often require a deep process of codification of the tacit knowledge in order to carry out the essential organisational reengineering. For example engineering industries are characterised by relatively higher spending in the low *visibility* areas of development, design and engineering. The process of innovation is generally decentralised and the low effectiveness of patents (See Table 1.5) requires the maintenance of a high level of secrecy, which inevitably reduces the degree of *visibility*. Other industries such as chemicals and pharmaceuticals exhibit a higher *visibility*. As shown in Table 1.3, the share of spending in highly *visible* activities (mainly R&D and fixed capital) is very high. Moreover, as illustrated in Table 1.4, both of the industries present a relatively large proportion of spending in the areas of basic and applied research. Moreover, for

the chemical sector, Moretti (1999) reports that the degree of cultural distance on average appears to be low and the degree of codifiability and the effectiveness of patenting are definitely high. As for the pharmaceutical sector Ramirez and Tylecote (1999) report that firms regularly display their expenditures on capital, R&D and marketing; the research and specially the development processes are extremely regulated<sup>20</sup> and generally very centralised; and the final product embodies a high degree of codified knowledge.

**Table 1.4 Distribution of R&D activity in 1985, UK**

Sector	Basic research	Applied research	Development	Total
Mechanical engineering	35.4	20.8	43.8	100
Motor vehicles and other transport equipment	29.2	20.5	50.3	100
Electrical and electronic engineering	29.3	24.9	45.8	100
Aerospace	36.6	17.3	46.1	100
Office machinery	0.8	24.4	74.8	100
Chemicals and pharmaceuticals	30.4	54.7	14.9	100
Food, drink and tobacco	48.2	38.6	13.2	100

Source: Doudeyns and Hayman (1993).

When the degree of *visibility* is low, an observer must be very perceptive “in order to judge whether the firm should be funded, and to monitor progress. In general, this perceptiveness needs to be firm-specific – the closer the acquaintance with that particular firm, the better; although no doubt a general knowledge of the industry will help too” (Tylecote and Conesa, 1999, p.27). Therefore, according to this theoretical framework, systems of corporate governance where insiders play an important role such as the German and the Italian ones will have an advantage in low *visibility* industries over outsider types of systems such as the American and British ones. On the other hand, in high *visibility* industries, such as chemicals and pharmaceuticals, the German and Italian high *firm-specific perceptiveness* becomes redundant and all other things being equal, outsider systems present an advantage over the insider ones (see Section 1.5.3 for a thorough discussion on this topic).

<sup>20</sup> During the development process companies have to provide data and information to the regulatory authorities.

### 1.5.2 The degree of appropriability

As mentioned also in Section 1.2, the *appropriability* of innovation refers to the level of appropriation of the returns on investment by those who provide capital. Arrow (1962) suggests that the production of new economic knowledge suffers from several causes of market failure one of which is its public nature, which means that it “inevitably involves spillovers to others besides the shareholders such as the employees and the customers/suppliers” (Arrow, 1962, p.10). This phenomenon is therefore extremely acute when instruments of appropriation such as patenting are not very effective and secrecy becomes more important, when innovation “requires and involves a large element of cumulative learning on the shop floor”<sup>21</sup> (Tylecote and Conesa, 1999, p.28) as in the object-oriented industries<sup>22</sup> and, finally, when it “requires and involves close contact with suppliers or customers” (ibid. p.28).

The concept of appropriability, especially with reference to the employees, is strictly connected with the various types of innovation described in Section 1.2. In fact, in sectors characterised by infrequent competence-destroying innovations and frequent competence-enhancing innovations, the importance of the core competences will be higher and the appropriability with respect to the employees will be lower. On the other hand, in sectors characterised by frequent competence-destroying innovations, the firm will need to frequently renew its core competences, which will often require a change in a large part of its workforce.

Again, it is possible to distinguish between industries with a low level of *appropriability* such as engineering and industries with a high level of *appropriability* such as the chemical and pharmaceutical ones. The former group is in fact based on *object-oriented* technology (with a heavy demand of accumulation of skills on the shop floor and importance of core competences) and it is

---

<sup>21</sup> In sectors characterised by infrequent competence-destroying innovations (see Section 1.2), and frequent competence-enhancing innovations, the importance of the core competences will be higher and the appropriability with respect to the employees will be lower.

<sup>22</sup> Itami (1994) suggests that when the technology is object-oriented, or in other words, when it is aimed at producing a fixed object like in the steel and automobile industries, the importance of the accumulation of skills on the shop floor is much higher than when the technology is function-oriented that is, when it is aimed at producing something “with a fixed and targeted function, like a chemical to provide a certain reaction or a computer software to provide a certain information processing function” (ibid., p.5).

characterised by a need for close long-term inter-firm relationships due to the use of components and other sub-systems supplied by other firms. In addition, as mentioned before, means of appropriation such as patenting do not seem to be as effective as in other sectors and firms tend to rely more on secrecy. On the other hand, chemicals and pharmaceuticals are based on a *function-oriented* technology and the use of patents appears to be essential in the innovation process<sup>23</sup> (See Table 1.5). At the same time, however, within engineering there are sectors, such as electronics, characterised by a high level of change of the key technologies, for which, as suggested by Tylecote and Conesa (1999, p.29) it can be assumed that the relationships with suppliers and customers need to change very rapidly, “in an almost kaleidoscopic way”. On the other hand, within chemicals it is necessary to distinguish between volumes chemicals,<sup>24</sup> “where one may expect to find arms-length relationships with customers”, chemicals effects,<sup>25</sup> “where the needs of particular customers are likely to be of importance and CLIR (close long-term inter-firm relationships) therefore seem likely to be helpful” and pharmaceuticals and agro-chemicals, “where the customers are too numerous for CLIR to be relevant, and relationships upstream are rather unimportant” (ibid., p.29).

**Table 1.5 Inventions that would not have been developed in the absence of patent protection (%)**

Sectors	Number of inventions
Electrical equipment	11
Machinery	17
Motor vehicles	0
Fabricated metal products	12
Instruments	1
Office equipment	0
Primary metals	1
Rubber	0
Chemicals	38
Pharmaceuticals	60

Source: Mansfield (1986).

According to Tylecote and Conesa (1999) there are two polar approaches that can be used and that present different degrees of efficiency according to the level of

<sup>23</sup> See Archibugi and Pianta (1996).

<sup>24</sup> Bulk steel, glass production, etc.

<sup>25</sup> Paints, adhesives etc.

*appropriability*. When it is high, such as in the chemicals and pharmaceutical industries, the best strategy seems to be the *shareholders first and last*, where “the only stakeholders whose interests are considered are the shareholders. Accordingly, it is only them (or management on their behalf) who provide the resources for the innovation. Strategies of innovation and means of appropriation are chosen to maximise shareholders return” (ibid. p.27). On the other hand, when the degree of *appropriability* is low and there are many spillovers to others such as employees, suppliers and customers, the best strategy seems to be that of constructing some kind of coalition with the other beneficiaries of the innovation who therefore turn out to be *included*.

### **1.5.3 The novelty of innovation**

The *novelty* of innovation indicates the extent to which an innovation requires “radically new means of development or production, and/or radically new markets or selling methods” (ibid., 1999, p.30). The degree of *novelty* of a particular industry therefore synthesises types of information such as the degree to which technological change is characterised by a recurrent or, unusual but ongoing, radical break with the past (for example the speed at which new technologies are being integrated into the industry’s dominant processes and products, the introduction of new materials); the experience of fundamental changes in the nature or the behaviour of the market which affects the way technological processes are carried out (for example in defence electronics, the market is now shrinking and firms are more subject to normal costs and market disciplines encouraging a more active search for civil uses for technologies of defence origin); the occurrence of important changes in the methods of appropriation such as the shift in the software industry from copyright to patenting and so on.

Referring to the characteristics of innovation introduced in Section 1.2, a sector is considered to have a high degree of *novelty* when the design discontinuities are very frequent, the technological cycles are very short and most of the innovations in the sector are competence-destroying. Moreover, the degree of *novelty* will be very high also if the innovations are not radical, but architectural or component, as long as the firm needs a profound organisational renewal and the development of new learning paths.

As reported by Tylecote and Conesa (1999) sectors such as electronics, pharmaceuticals and part of chemicals, present a much higher degree of *novelty* than the engineering industries in general (which however, have undergone quite important changes with the invention of NC<sup>26</sup> and CNC<sup>27</sup> machine-tools and the introduction of CAD<sup>28</sup> and CAM<sup>29</sup> technologies).

When the degree of *novelty* is high, what is needed is not the *firm-specific perceptiveness* of the insiders but a different type of knowledge that Tylecote and Conesa (1999, p.30) define as *industry-specific expertise*, “that is a good understanding of what is happening in the relevant technologies and markets across the sector”. When the degree of *novelty* is very high, new start-up firms might have an advantage as they do not have anything to unlearn. These firms will not have financiers with a good *firm-specific perceptiveness*, as this requires time. They will therefore need someone within the system with access to capital who has a high level of *industry-specific expertise*. “That capital should then be put into selected firms – all or most of it as equity, and the *industry-specific expert* should take a hand in corporate governance in at least the early stages of the firm’s development. This is ‘venture capital’. The requirement for established firms is not dissimilar: *industry-specific expertise* will allow a shareholder or other stakeholder to judge the firm’s current plans and projects and organisation against what appears appropriate now in the industry – whatever the firm’s track record” (ibid. p.36).

Insider systems, with their coalitions of stakeholders, tend to be characterised by conservatism and continuity, which might be of danger and might pose serious restrictions on innovation.

#### **1.5.4 Systems of corporate governance in terms of industry-specific expertise, firm-specific perceptiveness and strategy of appropriation**

As mentioned above, the most important distinction between systems of corporate governance is between insider and outsider systems.

---

<sup>26</sup> Numerical controls.

<sup>27</sup> Computer numerical controls.

<sup>28</sup> Computer aided design.

<sup>29</sup> Computer aided manufacturing.

The insider shareholders (family members, banks or other firms) and the powerful stakeholders (employees, customers and suppliers) characterising the former systems are expected to present a good degree of *firm-specific perceptiveness* and as a consequence to deal well with low *visibility* activities. In addition, the presence of *included* stakeholders should allow coping with innovative activities characterised by low *appropriability*. At the same time, the presence of these same powerful stakeholders and of coalitions among them introduces some degree of conservatism and organisational slack within firms, which, therefore, will pose difficulties in innovating in sectors characterised by a high degree of *novelty*.

On the contrary, outsider systems present a comparative advantage in high novelty sectors. In fact, in outsider systems, managers “can force through changes which employees might resist” (Tylecote and Conesa, 1999, p.35), and, as they are under constant pressure in various markets, they are also driven to the maximum efficiency. Certainly, firms in outsider systems need the support of financiers with a high degree of *industry-specific expertise* to be successfully innovative. In this respect, US institutional investors appear to be more prepared than the British ones.<sup>30</sup> This could be one of the reasons behind the observed superiority of the US over the UK in sectors characterized by the highest degree of *novelty*. At the same time, outsider systems, with their outsider shareholders and arm’s length type of relationships with the major stakeholders, will have a comparative disadvantage in sectors characterized by low *visibility* and low *appropriability*.

As mentioned in Section 1.1, the study of the relationship between corporate governance and product innovation is a new approach. To our knowledge only one other author has focused its research on the same type of relationship, namely Prof. William Lazonick. In the next section, we will highlight the main differences between the theoretical framework proposed by Prof. Tylecote and that suggested by Prof. Lazonick.

## **1.6 Tylecote and Lazonick compared**

An in depth and thorough account of Lazonick’s so-called “social organisation” approach to the study of innovation and corporate governance would

---

<sup>30</sup> See Tylecote (2000).

require a chapter on its own. Therefore, in this section we will summarise the main points of this approach focusing mainly on those aspects that are more relevant to the comparison with Prof. Tylecote's theoretical framework.

In line with the National Systems of Innovation approach, innovation is seen by Lazonick as the result of a learning process, which, according to the author is *cumulative, collective* and *uncertain*. It is cumulative because the learning that takes place at a certain point in time is based on the learning process that took place in a previous period. It can be collective in the sense that it can be the result of a process of interaction among various people, as distinct from collections of learning. "The empirical evidence on the innovation process in the advanced economies demonstrates both the prevalence and importance of collective learning, as distinct from collections of learning, in the generation of new knowledge" (Lazonick, 1999, p.3). Finally, the learning process is uncertain both because it can fail to produce an innovation and because the innovation produced by a firm might be surpassed by one produced by a competitor.

Given these characteristics of the learning process, firms that want to innovate effectively need to allocate resources and returns in ways that are *developmental, organisational* and *strategic*. In fact, as the learning process is cumulative, resources need to be allocated to it for a long length of time so that the production of new knowledge can be transformed into innovation. In addition, the collective character of the learning process requires resources to allow groups of individuals to learn interactively. Finally, the uncertainty of the learning process requires that the control over the allocation of resources be in the hands of strategists, who, according to Lazonick, have to be integrated into the cumulative and collective learning processes.

Two social conditions satisfy the requirements of the cumulative and collective character of the learning process, namely *financial commitment* and *organisational integration*. The former refers to the "fundamental condition that the business enterprise has sufficient access to financial resources to sustain both the innovation process until it can generate returns and the business organisation so that it can engage in continuous innovation" (Lazonick and O'Sullivan, 1998, p.47). The latter is the condition that "the people involved in the process of organisational

learning be willing and able to provide their skills and efforts to the pursuit of organisational goals” (ibid., 1998, p.47).

Different countries present different degrees of financial commitment (higher in Japan and Germany and lower in the US) and of organisational learning. Empirical evidence reveals national differences in the level of investment in the integration of the organisational learning. In some countries, the degree of integration is the highest with the governance system favouring the development of a learning process that integrates the capabilities of managerial and shop-floor employees. In other countries the level of interaction is very low and the learning process includes only a small number of highly educated employees. Countries differ also in the degree of horizontal-functional integration, between production and marketing, R&D and production and so on. “Although shaped by different product-market organisations, by making skill formation on the shop floor central to their investment strategies, the German and Japanese systems of integrating the skill and efforts of managers and workers both differ markedly from the American system. In the American case, the shop-floor investment strategy has been to substitute machines and materials for the knowledge and skill of workers. What all three systems – the German, the Japanese, and the American – have in common, however, is investment in managerial learning and organisational structures that are at its basis as the historical precondition for the shop-floor investment strategy, whether it be skill-creating as in Germany and Japan or skill-displacing as in the United States. And all three systems differ from the British case in having a strategy and structure of learning at the managerial level” (Lazonick and O’Sullivan, 1998, p.45).

To summarise, for Lazonick innovation is the result of a learning process that takes place over time and requires the cooperation and integration of numerous individuals. For these conditions to be possible, corporate governance systems need both to favour the inclusion of the largest number of individuals in the learning process for a long length of time and to allow the long-term commitment of financial resources for this purpose.

As explained thoroughly above, Tylecote’s framework can be described as a National-Technological System approach. As much as Lazonick, Tylecote rejects the neo-classical view of technological change as an exogenous phenomenon and stresses the centrality of the firm in the process of innovation. A first important difference between the two authors is the relative low importance given by Lazonick

to the differences among various sectors. In fact, whereas Tylecote bases his whole theoretical framework on the different requirements of diverse technologies, Lazonick confronts this issue in a few lines. “Not only do national institutions and historical evolution matter. The organisational learning opportunities and requirements of particular technologies matter as well. The collective skill bases that, when organisationally integrated, generate innovation vary across industries characterised by different technologies that provide different opportunities for organisational learning. For example, organisational learning in the pharmaceutical industry relies on the integration of a different skill base than organisational learning in the automobile industry” (Lazonick, 1999, p.7).

The above arguments are very similar to Tylecote’s statements about the different degrees of *appropriability* of various sectors and the following need to include the more innovative employees in the strategy of the firm. Lazonick, however, never conceives the possibility of a *shareholders first and last* strategy (the situation where the *appropriability* is the highest) and argues: “An understanding of the social foundations of innovation – the need for organisational integration and financial commitment – to develop the relations between insiders in a process of organisational learning, leads one to question the fundamental premise of the market control perspective. That premise is that shareholders are the ‘principals’ in whose interests enterprises should be run. An understanding of the fact that financial shareholders are outsiders to the social process through which innovation and economic development are achieved is the basis for direct confrontation with the ideology of the market control perspective”. “Contrast the liquid and diversified position of a public shareholder, the outsiders that the proponents of the market control perspective contend should bear title to the residual, with the position of an insider to the organisational learning process. Consider an employee who has worked for the company for a long period of time, who has skills that are specific to the products and processes of the company, and whose entire personal wealth is often dependent and continued success of the company. The assets of these employees are far more at risk than the assets of public shareholders. [...] In applying their skills and efforts to the development and utilisation of products and process that may generate returns tomorrow or ten years from now, these employees expect to share in those returns in the forms of employment stability, promotion, higher pay, better work conditions, etc. Indeed, it can be argued that the expectations of these shares and the

existence of governance structures that will distribute them to the employees, are central to generating the residual revenues in the first place” (Lazonick and O’Sullivan, 1998, p.58). However, it must be said that even if in theory Tylecote’s conceives the possibility of a *shareholders first and last* strategy, this is only an ideal. In fact, the empirical evidence collected in the first two years of the COPI project has proved that even if there is a difference in the degree of *appropriability* of different sectors, it is never total and as a consequence, there is always need for some degree of *inclusion*.

As for the other stakeholders, namely those that according to Tylecote often need to be *included* (customers, suppliers, government, education system and so on), to the knowledge of the author, they are not mentioned by Lazonick. However, we imagine that if they prove to be important in the learning process of a particular sector he would suggest that they need to be integrated.

It is in the ideas concerning the financing of innovation that we find the main differences between the two authors. As mentioned above, Tylecote argues that if the *visibility* of innovation is low, those who finance it need to have a *firm-specific perceptiveness*, or, in other words they need to know the firm with the same familiarity an insider has. Large majority shareholders, insider banks, powerful financial institutions and even small and dispersed minority shareholders but with a long-term perspective and trust in the management are the better financers of innovation in low *visibility* sectors. In addition, within an enterprise, the effectiveness of the allocation of resources to different investment projects depends on the type of information that reaches those who are in control, which is influenced by the complexity of the firm (geographical distance, hierarchical distance) and by the degree of interaction among individuals. When the *visibility* is high, the financers of innovation can be easily informed and as a consequence it should not be difficult to reach an appropriate and effective level of spending.

Lazonick argues that those who are in control need to be well informed and to be integrated in the innovation process: “the identity of strategic decision makers, and in particular their comprehension of the complexities of the learning processes to which they commit resources, matters to the success of innovative strategies. [...] To implement an innovative strategy, strategic decision makers require knowledge of particular organisations and technologies so that they can commit productive resources to an innovation process in accordance with their evaluation of the

potentialities and problems of alternative learning strategies. [...] To pursue innovative strategies, the decision makers who control productive resources must be themselves integrated into the learning process that is the essence of an innovative strategy” (Lazonick, 1999, p.4). At the same time, however, Lazonick does not consider the identity and characteristics of those who finance the innovation. In addition, he argues that the corporate governance system should make sure that retained earnings (the most important source of finance of innovation) remain within the firm, and does not consider other sources of finance as being very relevant. “The experience of the most successful economies such as the United States, Germany, and Japan show, however, that enterprises that emerged to become dominant product markets and national economies in which they operated did so not because they used the returns from successful innovation to advance the interests of “owners”, but because they retained them within the enterprise and channelled them back to finance the collective and cumulative learning process required for continuous innovation by the enterprise. [...] Retained earnings have been the basic source of corporate finance during those periods when the corporations, and the national economies in which they are based, have experienced rapid growth. From the perspective of organisational control, retained earnings provide enterprises with the financial commitment that is essential for the successful implementation of innovative investment strategies” (Lazonick and O’Sullivan, 1999, p.57). “National policy for corporate governance should ensure that current stakeholders, be they insiders or outsiders, do not extract so much of the returns from the business enterprise that its long-term potential for continuous innovation is effectively undermined” (ibid., p.59). Tylecote, on the other hand, focuses on the various characteristics that those who finance innovation (banks, financial institutions, shareholders and so on) should have in order to cope with the requirements of the different sectors.

Both authors agree that local institutions play an important role in favouring innovations, and refer to the educational system, to the government, to the law system and so on as important elements influencing the innovative potential of a firm.

According to Tylecote, sectors differ in the degree of *novelty*. When the technological change follows a predetermined path with no radical changes, the degree of *novelty* is low. On the other hand when there are radical breaks with the past the degree of *novelty* is high. In this latter case, according to Tylecote, new start

up firms might have an advantage as they have nothing to unlearn, whereas well established firms might have problems due to conservatism and long-term agreements with employees, suppliers and customers. Again, the neglect of the technological differences among sectors leads Lazonick to argue that immobility of capital and people within the enterprise are essential to the learning process and therefore to innovation. "The success of the innovation process therefore depends on the immobility of money and people to alternative uses via the market, and thus the social foundations of innovation require the innovative enterprise to control market forces rather than be controlled by them. The immobility of financial resources required for innovation occurs not because of market imperfections but because of the prospects of the success of particular organisations" (ibid., 1999, p.56).

To conclude, the main differences between the two authors arise from the lack in Lazonick's theoretical framework, of a thorough analysis of the technological differences among sectors and as a consequence of the requirements in terms of corporate governance and financial systems to achieve the appropriate and effective spending in innovation.

## 2. Method

### 2.1 Introduction

In Chapter 1 we presented a review of the literature on corporate governance and product innovation, introducing, in Section 1.5, the theoretical framework utilised in this thesis. The remainder of the thesis deals with the relationship between corporate governance and product innovation in Italy and in the machine-tool sector.

This chapter reviews the method employed in collecting and studying the empirical data. In Section 2.3.1, we illustrate the main variables used in studying the Italian system of Corporate Governance from the point of view of the framework (Chapter 3), namely the degree of *firm-specific perceptiveness*<sup>1</sup> of those who finance innovation, their degree of *industry-specific expertise*<sup>2</sup> and the degree of *inclusion* of the stakeholders.<sup>3</sup> We also explain what variables were investigated in the study of the machine-tool sector (Chapter 4), in order to draw conclusions about the degree of *visibility*<sup>4</sup>, *novelty*<sup>5</sup> and *appropriability*<sup>6</sup> of innovation in the sector. As the topic under investigation is very new, we felt the need to perform some exploratory analyses. This was done through two case studies, which are presented in Chapters 5 and 6. Section 2.3.2 of this chapter illustrates the reasons for choosing the two firms and the way the data were collected and examined. Sections 2.3.4 and 2.3.5 describe the two databases that were employed both in studying the machine-tool sector in Europe and Italy (Chapters 4 and 7) and in testing some hypotheses of the theoretical framework (Chapter 7). Finally Section 2.3.6 deals with the COPI survey. It explains

---

<sup>1</sup> *Firm-specific perceptiveness* is the ability to “judge whether the firm should be funded, and to monitor progress. In general, this perceptiveness needs to be firm-specific – the closer the acquaintance with that particular firm, the better; although no doubt a general knowledge of the industry will help too” (Tylecote and Conesa, 1999, p.27). See Chapter 1, Section 1.5.1.

<sup>2</sup> *Industry-specific expertise* consists on “a good understanding of what is happening in the relevant technologies and markets across the sector” (Tylecote and Conesa, 1999, p.30). See Chapter 1, Section 1.5.3.

<sup>3</sup> The degree of *inclusion* depends on the existence of a coalition with the main stakeholders in the innovation process. See Chapter 1, Section 1.5.2.

<sup>4</sup> The degree of *visibility* measures “how easy is it for someone who is not closely involved in managing the development of a new product or process, to judge what resources are being devoted to it and how well they are being spent” (Tylecote and Conesa, 1999, p.25). See Chapter 1, Section 1.5.1.

<sup>5</sup> The degree of *novelty* indicates the extent to which an innovation requires a “radically new means of development or production, and/or radically new markets or selling methods” (Tylecote and Conesa, 1999, p.26). See Chapter 1, Section 1.5.3.

<sup>6</sup> The degree of *appropriability* refers to the level of appropriation of the returns on investment by those who provide capital. See Chapter 1, Section 1.5.2.

the main phases in the preparation of the questionnaire, the piloting and the sample of firms, and the response rate. The results of the questionnaire were used in Chapter 7 to support the arguments about the Italian machine-tool sector.

## **2.2 Research paradigm: the two philosophies**

At the beginning of any research project within the social sciences, a researcher faces an important dilemma, namely which philosophical position to adopt. At the two extremes of a continuum there are in fact two very different philosophies, two ways of approaching reality and research that dictate the most appropriate methods to adopt. On one side there is the so-called positivistic paradigm.<sup>7</sup> Those who adopt this philosophy believe that the social world exists externally and that its properties are to be studied through objective methods, instead of being inferred subjectively through sensation, reflection or intuition. The social world, as much as the natural, is believed to be regulated by fundamental laws and the aim of research is to identify those laws and to explain regularities in human social behaviour. To do this, science proceeds by formulating hypotheses, which then are tested against quantitative data collected in large samples so as to allow generalisations. It follows that the most common methods of collecting data used by those who work within the positivistic paradigm, are cross-sectional studies, experimental studies, longitudinal studies and surveys. The data are then analysed through statistical techniques, which allow the determination of the confidence levels of stating that the characteristics found in the sample will be present in the population as well.

The second paradigm emerged during the last half century, and it is called the phenomenological paradigm. It stems from the idea that the world and reality are socially constructed and given meaning by people. According to this philosophy it is not possible to identify the deterministic laws of behaviour as human beings have free will. The aim of the researcher is to appreciate the different meanings that people give to their experience and to understand why people have different experiences. From an epistemological point of view, it is argued that the presence of the researcher, his values, and beliefs cannot but influence the results of the study. In addition, the use of quantitative data is considered as an excessive simplification of

reality, as there are several qualitative aspects that cannot be expressed in quantitative terms.

This thesis is essentially positivistic as it aims to test a set of hypotheses about the requirements of different technologies in terms of corporate governance. In the research process, however, we make extensive use of both quantitative and qualitative methods of data collection (methodological triangulation). We also use data triangulation, “where data is collected at different times from different sources in the study of a phenomenon” (Esterby-Smith et al., 1991, p. 133).

## **2.3 The method**

### **2.3.1 The review of the literature**

The first stage consisted of a critical review of the literature on National Systems of Innovation and corporate governance.<sup>8</sup> This highlights the scarce attention given by the existing literature to the relationship between Corporate Governance and Product Innovation. The use of a new theoretical framework was then justified.

In the second stage, the literature on the Italian system of corporate governance and on the machine-tool sector were reviewed in light of the hypotheses of the framework. As for the review of the corporate governance system (Chapter 3), we tried to establish three main issues, namely to what extent Italian shareholders, lenders and other stakeholders have the *firm-specific perceptiveness* required to cope with low *visibility*; to what extent those same groups have the required *industry-specific expertise* to cope with high degrees of *novelty*; and finally, what degree of *inclusion* the most important stakeholders in the innovation process possess.

A high degree of *firm-specific perceptiveness* of the shareholders, lenders and other stakeholders derives from some sort of relationship with the firm, so a reasonable duration of such a relationship is regarded as necessary, even if not sufficient, for it. We therefore investigated whether there are any kinds of informed insiders, such as family shareholders, banks with a “relationship banking” tradition, active institutional investors or even well informed civil servants.

---

<sup>7</sup> For a thorough description of the two paradigms see Hussey and Hussey (1997).

<sup>8</sup> See Chapter 1.

With regard to the *industry-specific expertise*, we analysed the expertise of banks and other financial institutions, venture capitalists, or individual investment analysts and of the state institutions that provide grants for R&D.

As for the degree of *inclusion* of customers, suppliers and employees, we studied the type of relationship firms have with these stakeholders. The issues investigated were the existence of networks of shareholdings with customers and suppliers, or of other forms of close long-term agreements, and also the degree of trust. As for the employees, we analysed their degree of permanence within the firm, their influence on the formulation of corporate strategy, and the type of relationship with the management. We investigated the system of wage determination and industrial relations to verify if these favour investments in skills by workers and firms. We studied the degree of employment protection in order to see whether this makes it difficult or expensive to dispose of surplus labour. We have also considered the degree of conservatism of the employees that could hinder the innovation process.

Correspondingly, in the analysis of the machine-tool sector (Chapter 4), we have tried to establish the degree of *novelty* and *visibility* of the technology utilised in this sector and the degree of *appropriability* of the returns of innovation. With particular reference to *novelty*, we tried to establish how far technological change in the sector is proceeding along an established trajectory. We did this by looking at the R&D intensity and at the rate of growth of industry sales and of patenting. We also interviewed an expert in the sector<sup>9</sup> and made use of information contained in the CIS database.<sup>10</sup>

As for the degree of *visibility*, we investigated three main issues. First of all, we analysed the *distance in space* between the people who have direct responsibility for and are directly involved in the innovation process and those who have control over the provision of finance and indeed the firm itself. This type of distance can take several forms. For example there could be geographical distance, which reduces the possibility of having face-to-face meetings. Alternatively, there could be hierarchical distance, if the firm is very complex and there are several hierarchical

---

<sup>9</sup> In December 1999, we interviewed Dott. Battaglia, who is the economic expert of UCIMU, the Italian association of machine tool builders.

<sup>10</sup> See Section 2.3.5 of this chapter for more information on this database.

layers. There could also be cultural distance, both in terms of national culture and in terms of difficulties in communication between people with different backgrounds (technical and managerial). For obvious reasons, the distance in space is more likely to be small if firms are small and if innovative activities are centralised. In addition, as mentioned in Chapter 1, it will also be lower for basic research rather than for design and development. Secondly, we focused on the *distance in time*, that is the time that elapses between the expenditure of money and the returns in terms of profits or market share. Thirdly, we analysed the *ease of evaluation* of expenditure on innovation. This is strongly influenced by the degree of codifiability of knowledge, by the proportion of expenditures in highly visible activities such as fixed capital as opposed to less tangible ones, and by the degree of secrecy maintained on innovation.

As for the degree of *appropriability*, we looked both at its level before the innovation and at that after the innovation takes place. In fact, the overall appropriability will be low even if patents or other forms of protection work effectively when the cooperation of other stakeholders is essential to achieve an innovation. We have investigated the effectiveness of forms of protection, like patents and secrecy, referring both to the literature and to the comments of the experts in the sector. We also studied the type of technology embodied in machine-tools, in an attempt to categorise it as *function oriented* or *object oriented* (Itami, 1994)<sup>11</sup> and also to study whether it requires a cumulative knowledge on the shop floor (which needs the cooperation of employees) or whether it is characterised by radical breaks with the past (which is favoured by a low degree of inclusion of a large part of the employees). The important role played by suppliers and customers in the innovation process is another indication of a low degree of appropriability.

Naturally, the available literature was not sufficient in order to gather satisfactory information about all of the issues under investigation especially those relating to the Italian case. This is because the data are usually collected in order to test particular theories and the theoretical framework utilised in this thesis is fundamentally new. For this reason, the following phase in the research was carried out through case studies. In fact, case studies, especially if of the illustrative type, are an essential tool during any type of exploratory analysis. Case studies allow the

---

<sup>11</sup> See Chapter 1, Section 1.5.2.

investigation of issues with which a researcher is not very familiar, such as when the literature is not extensive. In addition, as reported by Yin (1994) case studies are the preferred strategy when the research aims not only to explore certain phenomena, but also to understand them within a particular context, and more in general when "how" or "why" questions are being posed. At this stage it would not have been possible to proceed with a questionnaire for example, because our understanding of the mechanisms of product innovation and corporate governance in the sector was still not sufficient, and we could have risked asking inappropriate questions. Case studies were therefore used to improve our knowledge of the sector and of the type of pressures felt by the various parts of the organisation. For the same reason we carried out semi-structured interviews which, even if time consuming, allow us to explore answers in more depth. As summarised by Burgess (1982), semi-structured or unstructured interviews are an "opportunity for the researcher to probe deeply to uncover new clues, open up new dimensions of a problem and to secure vivid, accurate, inclusive accounts that are based on personal experience" (ibid., p.170). In addition, as suggested also by Easterby-Smith, Thorpe and Lowe (1991), unstructured and semi-structured interviews are an appropriate method when the subject matter is highly confidential and commercially sensitive and when the interviewee may be reluctant to be truthful about the issue under consideration other than confidentially in a one-to-one situation. Indeed, innovation in the machine-tool sector is undoubtedly a highly confidential matter.

### **2.3.2 The case studies**

The premise was to analyse two case studies, one of a small, family-business firm and one of a large firm, possibly a group, with several subsidiaries positioned both in proximity to and far from the headquarters and possibly with outsider shareholders. The use of case studies at this stage of the analysis was not meant to test any hypotheses but attempt to widen our knowledge of the topic in order to proceed wisely and effectively to the next stage. Therefore the small sample size should not be of any concern.

We did not have any difficulty in gaining access to the first firm, Stam. We contacted the majority shareholder and CEO via e-mail, explaining the aim of the project. He was enthusiastic and granted access immediately.

As for the second firm, we had a few problems. In fact, only one firm within the machine-tool sector is listed on the stock exchange but it is part of a much larger and diversified group (Fiat). Choosing this firm would have meant studying a rather complex bundle of relationships, synergies, and interests with no assurance of being able to understand the real lines of power and responsibility. In addition, due to its size (around 10,000 employees), this firm would not have been very representative of the Italian average firm. On the other hand, the other groups in the sector, even if of medium size, do not have firms listed on the stock exchange and we were very much interested in studying this aspect of corporate governance as a possible future option for other firms in this sector. For this reason, we decided to look at other sectors, which had similar characteristics to the machine tool sector. Most of the engineering sectors are rather similar in terms of *novelty*, *visibility* and *appropriability*. Within one of these sectors, the minimills one, we highlighted the Danieli Group, which seemed appropriate for this analysis. The headquarters of the group are listed on the stock exchange. The group is rather internationalised, though not of a considerable size and it is notoriously very innovative. Access was not easily obtained due to the extreme priorities given to secrecy. However, after the theoretical framework was thoroughly explained, the President proved to be very interested and provided a strong support.

Among the various sources that are usually used in collecting data for a case study, such as documents, archive records, interviews, direct observation, participant observation and physical artefacts, we focused mainly on publicly available information and on semi-structured interviews. Secondary data comprised company annual reports, newspaper articles, journal articles and industry/market reports. These data were found by searching libraries and browsing the Internet. Internal reports were provided by the companies.

In both firms, initial data was collected through semi-structured interviews carried out through a *cascade*, starting from the highest levels in the firms and proceeding to the lower ones.

The topic of the research was thoroughly explained to the interviewees immediately before starting the interview. All interviews were conducted face-to-face. We decided not to use the audio recorder both because the topic covered some confidential and commercially sensitive information and also because we thought that the interviewee would not have been as comfortable in conveying their personal

opinions. In addition, note taking is usually a very good means of data reduction.

The questions towards the Managing Directors, which were prepared prior to the interviews, are illustrated in Table 2.1. The case studies include also the other issues that arose during the semi-structured interviews. Most of the questions ask about figures and explanations of company processes. Some are “yes or no” questions. In some cases, the questions require an evaluation from the interviewee, for example in question 5.b.i which concerns the ability of the shareholders to assess the information they get from the firm. For these types of questions the possibilities offered to the interviewees were threefold, ranging from Null through Medium to High. We could have used a 5 or 7 point Likert scale. However, as mentioned several times before, case studies were used during the research process to gain better understanding of the topic and to widen our knowledge of it, not just to test a set of hypotheses. We were interested in understanding the average situation. For example, it was important to us to find out whether the understanding of the shareholders was High or Low. A Likert scale with 7 options, for example, could have given us an idea that the understanding of the shareholders was Rather High (6) instead of Very High (7), however this would not have made a huge difference.

**Table 2.1 Interviews with the top management and majority shareholders**

<ol style="list-style-type: none"> <li>1. <b><u>Overview of firm's activities</u></b></li> <li>2. <b><u>Structure of the firm</u></b> <ol style="list-style-type: none"> <li>a. Structure of ownership (presence of insider shareholders and their involvement in activities such as influencing the general strategy, influencing the remuneration of the top management and its composition.)</li> <li>b. Managerial lines of command, from the top management down to those who generate the innovations.</li> <li>c. Number of R&amp;D centres.</li> </ol> </li> <li>3. <b><u>Financial and accounting matters</u></b> <ol style="list-style-type: none"> <li>a. Number of profit centres or cost centres.</li> <li>b. Type of evaluation and control.</li> <li>c. Financial structure</li> <li>d. Forms of financing of R&amp;D and more in general innovation.</li> </ol> </li> <li>4. <b><u>Product innovation</u></b> <ol style="list-style-type: none"> <li>a. Who has the first new idea? (Customers, suppliers, employees or other?)</li> <li>b. Who decides whether the idea is feasible and on what basis?</li> <li>c. How long does it take to bring a product innovation to market, from initial conception to launch?</li> <li>d. Is there a system of rewarding those who produce a good idea? And if yes, of what type?</li> <li>e. How is R&amp;D and all other activities connected to the innovation, financed?</li> <li>f. Which is the most effective means of protecting product innovation from the competitors: patents on products and processes, secrecy or long-term contracts? Do you use any other form of protection?</li> </ol> </li> </ol>
--

- g. Does the need for secrecy represent a real obstacle in explaining to shareholders the work on product innovation taking place in your company?
- h. Do you think you are sufficiently investing in all the activities connected to product innovation? And if not, what are the main reasons?
- i. How would you define the technology employed in your sector? Are there frequent and radical breaks with the past, or is the technology proceeding along an established path? And in comparison to 5 years ago?

**5. Relationship with shareholders and lenders and other stakeholders**

- a. What information do the shareholders and lenders ask for and get? (Purely financial information? Broader information about its market position? In depth analysis of its technology strategy and progress in achieving it?)
- b. How well able are they to assess it?
  - i. Do they have a null, medium or high understanding of the firm and its managers, such that they can at least decide whether their information about the firm can be believed? In particular, what is their understanding of the company's financial and competitive position, its corporate strategy; its short and long-term technology strategy and the quality and competence of the current management team?
  - ii. Do they have a null, medium or high understanding of the industry and the technology? In particular what is their understanding of the market trends and the nature of the key technologies and the way they are developing?
- c. What are the consequences for the firm of them receiving various types of information about its performance? In other words, how would they react if the firm intended to cut its dividends in order to raise its R&D?
- d. Is the priority given in the formulation of the corporate strategy to the main stakeholders of the firm such as customers, suppliers, employees, society at large and government, null, medium or high? Is the company's priority that of maximising the shareholders' value even at the expense of the interests of these stakeholders?
- e. Has your company ever carried out/might it consider carrying out a major restructuring operation which involved/would involve dismissing a substantial number of employees? If yes, would the following considerations influence your decision? Problems of conscience: the inner feeling of responsibility to the employees; the social position in the local community would make it difficult; it would throw away skills which are likely to be valuable and thus in the long-run might be self-defeating; effectively blocked by our legal obligations to the workforce.

These interviews were conducted in order to gain an overview of the firms' activities and organisation and also to identify the main steps of the innovation process, the financing of innovation and the current and ideal level of spending in R&D and innovative activities in general. At the same time, managerial lines of command were identified, through departments and subsidiaries, down to middle managers and other stakeholders with hands-on involvement in the innovation. This allowed us to identify the best candidates for the successive interviews, which were arranged and planned during the first interview. During the interviews with the top managers we were also interested in finding out about the relationship of the firm with shareholders, lenders and powerful stakeholders. The focus was on information flows and understanding, and their consequences. For example, we asked what type of information the shareholders, lenders and other stakeholders required and

subsequently obtained and how well they were able to assess it. We were also interested in their usual reaction to long-term investment projects, or in other words, whether they were *patient* or not. We also asked about the role played by the interests of other stakeholders in the formulation of the corporate strategy. We focused mainly on the customers, suppliers and employees, as, from the literature review of the sector, these appeared to be the main stakeholders in the innovation process.

These interviews proved to be very important as they kept us apprised of the important issues in the workflow and enabled us to ask more informed questions in the subsequent interviews. In the following interviews, the central issue was the pattern of performance pressures imposed from the level above in the company hierarchy (See Table 2.2).

**Table 2.2 Interviews with middle managers**

<p><b>1. <u>Product Innovation</u></b></p> <p>a. Is enough being spent on innovation? If not, are the top managers aware of it?</p> <p>b. How strong are the performance pressures? (Null, Medium, High) In what way are they influencing the innovation process? Has the situation changed over the years?</p> <p>c. What is the system of remuneration? Are there profit-based bonuses? Is this influencing your incentives and perceptions?</p> <p>d. What considerations have played the most important role in deciding to pursue or discontinue an innovation project? For example, is more importance given to short-term profit or to long-term profit? To the interests of the employment, to those of the manager in charge of the project, or to a fair share between divisions and departments?</p> <p>e. How often is there a flow of information between the top management and the lower levels in the organisation? What kind of information is circulated? Purely financial information or more detailed reports, which include more technical information about the new product?</p> <p><b>2. <u>Interaction among functions</u></b></p> <p>a. The interaction among which functions is considered important for an effective innovation process in this sector? (Not important, Medium, Very Important)</p> <p>b. Is the level of interaction among such functions redundant, sufficient or lower than what is necessary? If it is lower, why do you think it is so?</p> <p><b>3. <u>Employees</u></b></p> <p>a. To what extent are the skills of the various categories of employees specific to the firm or relevant throughout the industry? (Not important, Medium, Very Important)</p> <p>b. What degree of autonomy do the technicians and blue-collar workers have in carrying out their activity? (Null, Medium, High)</p> <p>c. Is there any form of incentive for this class of employees to contribute to the innovation process?</p> <p>d. Would their suggestions be considered? And rewarded?</p> <p><b>4. <u>Relationship with the subsidiary</u></b></p> <p>a. How many times per year are there face-to-face meetings with the Headquarters of the group?</p> <p>b. What is the degree of autonomy from the Headquarters? (Null, Medium, High)</p> <p>c. What performance measures do the Headquarters employ in the evaluation of the subsidiary?</p> <p>d. How tight do you perceive the financial control from Headquarters, in terms of how they respond to a failure to meet financial targets? (Not tight, Medium, Very tight) And what</p>
---

about the non-financial control?

- e. How would you define the activities of your company relative to those of the group? Central or peripheral?
- f. Are there any factors that reduce the amount spent on innovation by the subsidiary, such as for example: Tightness of financial targets; Remuneration by profit centre results; Lack of centre's attention to/understanding of the underlying non-financial performance of the company; Difficulty of getting funding for product innovation.

The questions were similar to those mentioned above with the difference that in place of the shareholders were the higher levels in the organisation. For example, we asked how the performance pressures affected innovation and if enough was being spent in any type of activity connected to product innovation. We also asked about the system of remuneration and whether it was influencing managers' incentives and perceptions. We tried to understand what considerations played the most important role in deciding to pursue or discontinue an innovation project. For example, was more importance given to short-term profit or to long-term profit? To the interests of the employment, to those of the manager in the lead of the project, or to a fair share between divisions and departments?

We also wanted to know what type of skills are important for product innovation in this sector (firm-specific or industrial specific) and if those who had the ability to contribute to innovation were free to do it and had the incentive to do it. We asked what control measures were used by the higher levels in the organisation and whether such measures were perceived as short-term pressures. We also focused on the importance of interaction among various functions within the organisation, asking whether the current level was near the ideal level or lower.

While interviewing the top manager of a subsidiary we asked about the type of relationship that existed with the Headquarters, trying to uncover problems of distance in space and whether this had changed over time, due to mergers or acquisitions. We also asked about the type of control measures in place and how they were influencing the investment in innovation. We were also interested in knowing whether the subsidiary's business was at the core of the group's business or at its periphery, as this could influence the degree of industry-specific expertise of the Headquarters.

The qualitative information noted down during the interviews was processed

immediately afterwards. The interviews were typed, then the data was categorised and interrelated, and finally a summary of the interview was produced. Interviewees were allowed to read draft reports as a check on interpretations, and if required, to make changes.

**Table 2.3 Interviews**

<b>Stam</b>	3 interviews with <ul style="list-style-type: none"> <li>• The President, Major Shareholder and Salesman;</li> <li>• A member of the technical department;</li> <li>• The managing director.</li> </ul>
<b>Danieli</b>	5 interviews in the Headquarters. <ul style="list-style-type: none"> <li>• President</li> <li>• Financial Director</li> <li>• Production manager</li> <li>• R&amp;D Director</li> <li>• Legal Advisor</li> </ul> 1 interview in and Italian subsidiary <ul style="list-style-type: none"> <li>• President and general director</li> </ul> 8 interviews in the Swedish subsidiary <ul style="list-style-type: none"> <li>• General director</li> <li>• Sales manager</li> <li>• Financial director</li> <li>• Sales manager and responsible for innovative projects</li> <li>• Production manager</li> <li>• Shop floor worker</li> <li>• Secretary of the General director</li> <li>• Secretary</li> </ul>

At Stam, due to its rather limited size, we carried out three interviews, one with the owner and President, the second with an employee of the technical unit, and the third with the production manager. The interviews took place in December 1999 and lasted one and a half hours each, on average. (See Table 2.3).

In the second case study, the number of interviews was much higher. In fact, not only were we able to interview five individuals within the Headquarters<sup>12</sup> but we also obtained an interview with the president of one of the Italian subsidiaries.<sup>13</sup> The interviews took place during July-August 1999 and lasted between one and one and a

<sup>12</sup> Ing. Pattarini, the current President; Dott. Bianchi a legal advisor; Dott. Facchini, the financial director and President of the Swedish subsidiary; Dott. Alzetta, the responsible for a line of products, and Mr. Poloni, the R&D director.

<sup>13</sup> Mr Della Vedova.

half hours each. In November 1999 we went to visit the Swedish subsidiary of the group. Eight other interviews were held there. We also had the possibility to spend several hours with two of the secretaries and two of the managers (not simultaneously) outside the firm. This experience proved to be very important. They had all worked for the firm for 15 or more years, knew a lot about it and were willing to tell me as much as possible. In exchange, they wanted to know a lot from me. The cultural differences between the subsidiary and the Headquarters appeared to be rather high, and as will be thoroughly explained later, there was a strong need for an informal exchange of information. For example, we were asked how things actually work in the Headquarters in Italy, what the employees think of the firm, and what type of atmosphere is present in the work place. Moreover, they wanted to know what, in general, are the most important values for Italians and what type of relationship exists between those who manage and those who obey.

We visited the workshops of both the Italian and Swedish subsidiaries and this helped us to gain a better understanding of the products and of the production process. In fact, as we do not have a technical background, at the beginning we had some difficulties in following the explanation of the various steps of the innovation process. The terminology used was rather complicated and in any case it was different in each firm, being in a way rather firm-specific. The visit to the workshops made everything much clearer.

### **2.3.3 Further interviews**

Further semi-structured interviews were carried out with different individuals in order to develop some specific aspects of the research.

Dott. Battaglia, the Economic advisor of UCIMU (the Italian association of machine-tool builders) was interviewed in his office of Milan in December 1999. His help was of great importance for several reasons. In fact, he gave us a general overview of the sector and of the services that UCIMU offers to its associates. In addition, he highlighted those that are considered the most important problems in the sector, which inspired the section of this thesis that contains the econometric analysis.<sup>14</sup>

Further interviews were held with three of the top managers of Banca

---

<sup>14</sup> See Chapter 7.

Antoniana Popalare Veneta, the headquarters of one of the largest banking groups in Italy and with the director of one of the hundreds of branch offices. The interviews took place both in Padua and in Udine in April 2000. These interviews were aimed at studying the relationship between corporate governance and product innovation in the banking sector within the COPI project. However, during these interviews we could also ask about the degree of *industry-specific expertise* and *firm-specific perceptiveness* of large banks and of their attitude towards their clients' investments in innovation. We were very interested in understanding whether Italian banks invest in the formation of expertise in particular sectors as the literature review seemed to suggest that the degree of *industry-specific expertise* of Italian banks is very low.

Another series of interviews took place in another smaller bank located in the North East of Italy at the centre of one of the most famous industrial districts, namely the Chair district. Recent studies suggest that banks within industrial districts played a central role in the development of the districts. During these interviews, therefore, we tried to understand in what way the activities of this bank differed from those of the larger bank. The main goal was to check whether there was any possibility that some bank could play a central role for the financing of firms in the machine-tool sector.

#### **2.3.4 The Mediocredito database. Indagine strutturale sulle imprese manifatturiere italiane (Structural analysis of Italian manufacturing enterprises)**

The database is based on a representative sample of around 5000 Italian firms with more than 10 employees.<sup>15</sup> Its aim is to gather information of qualitative and quantitative type concerning the Italian industrial system and in particular the small and medium enterprises.

An English translation of the questionnaire is reported in Appendix 1. It comprises questions regarding the structure of ownership and control, the structure of employment, the existence of the group-form; types of investment and financing; the R&D activity, innovation and training; the propensity to use financial instruments; the existence of inter-firm agreements, the use of public and European forms of support. In addition, it contains balance sheet data for a three-year period.

The questionnaire used in the construction of the database, was not built in order to gain data to test particular hypotheses, but it was an attempt to give an overview of several aspects concerning Italian small and medium firms.

The database is certainly the largest source of information about small and medium firms in Italy. It is built by the *Osservatorio* of the Mediocredito Centrale.<sup>16</sup> Up until now, the *Osservatorio* has carried out three investigations. The first concerned the 1989-91 period and was completed in 1994. The second concerned the 1992-94 period and was completed at the beginning of 1997. In the second semester of 1999 the third investigation concerning the period 1995-97 period was completed.

In this work, we used the Mediocredito database for the 1992-94 period. Obtaining permission to use the database was a great achievement but the whole procedure took several months. It would have been very interesting to obtain the third database but it only became available to the public quite recently, and further analyses would have delayed the completion of this thesis.

Among the 5000 firms within the database, we worked with those belonging to the machine-tool sector. We encountered several difficulties in identifying these firms as the database used a very old form of classification called Ateco81 and we could not find any reference to this form of codification. Fortunately, in one of our trips to Italy we finally found a table of conversion between the old classification and the Nace codes, for which we had the codification. The number of firms belonging to the machine-tool sector turned out to be 124, a quarter of the entire population of the sector.

The Mediocredito database, together with the CIS database,<sup>17</sup> were used at two stages of the research. Firstly, together with a review of the literature, they were used to try and obtain a preliminary understanding of the machine-tool sector in Italy. Secondly, once we had carried out the case studies and consulted several experts in the sector, the database was used to carry out further investigations and to test some of the hypotheses of the theoretical framework.

It must be highlighted that the structure of this thesis does not necessarily reflect the chronology of the research. For example, Chapter 4 does not only contain a review of the literature on the machine tool sector but it also includes

---

<sup>15</sup> The sample consists of firms randomly chosen after a stratification based on turnover, industry and geographical distribution.

<sup>16</sup> Mediocredito Centrale is a merchant bank.

considerations that could only be made after carrying out the case studies.

### **2.3.5 The CIS database**

The Community Innovation Survey (CIS) was the first survey on innovation carried out on a large scale in a harmonised way in the 12 Member States of the EU at that time plus Norway and Iceland (CIS database, 1997). It was also the first time that data of different surveys on innovation were stored in a common database. The survey was jointly initiated and implemented by Eurostat and DG XIII under the aegis of the European Innovation Monitoring System (EIMS), part of the Innovation Programme. It was developed between 1991 and 1993 in cooperation with independent experts and the OECD. The questionnaire was developed on the basis of the 'OECD Guidelines for collecting and interpreting data on technological innovation - the Oslo manual' (OECD, 1992).

For many years, studies on innovation were carried out on the basis of the so-called linear model of innovation, or, in other words, the idea that there is direct, positive relationship between investments in R&D and technological and economic development. More recently, new theories of innovation have stressed that R&D is not the only source of the continuous development of the knowledge base of an enterprise. Statistics on R&D and patents (which were used for a long time as a proxy for the innovativeness of a firm) became insufficient to describe the innovation process of the enterprise. During the eighties new survey instruments were developed in many European countries (Germany, Italy, France, the Netherlands and the Nordic countries) to find new and more complete information about firms' innovation process (CIS database, 1997). The Oslo Manual (OECD, 1992) was a result of the strongly felt need for international comparability and the Community Innovation Survey is the biggest effort to implement the guidelines contained in the manual.

The Survey (CIS) collected data from about 40,000 firms in all EU Member States, Norway and Iceland. Italy contributed greatly to such a high number as more than 22,000 of the firms were Italian.<sup>18</sup> The database comprises general information about the structure of the enterprise, its economic activities and information about innovation activities; the sources of information for innovation; the objectives of innovation; the acquisition and transfer of technology; the level of R&D expenditure;

---

<sup>17</sup> See next section.

factors hampering innovation; the cost of innovation; the impact of innovation.

The database contains only macro-classifications. In other words we only have data about the macro-category 29-Manufacture of machinery and equipment, which does not only contain the subcategory 29.4-Manufacture of machine tools, but also 29.1-Manufacture of machinery for the production and use of mechanical power, 29.2-Manufacture of other general purpose machinery, 29.3-Manufacture of agricultural and forestry machinery, 29.5-Manufacture of other special purpose machinery 29.7-Manufacture of domestic appliances. However, given the strong similarity between these sectors, we think that we did not include a strong bias in using these data as a proxy for the machine-tool sector.

The data in the database are presented only in aggregate form, with the mean and standard deviation for each variable.

The CIS CD was loaned us by the University of Sheffield. Istat (the Italian statistical public organisation) provided a few specific tables on the Italian case.

### **2.3.6 The COPI survey**

The questionnaire for the survey was developed between January and October 2000. A copy of the questionnaire can be found in Appendix 2. It comprises four different sections. The first is dedicated to the relationship of the firm with its shareholders and major stakeholders. The second refers to R&D and the third to the relationships with employment. The fourth section was to be answered in place of the first one in case the firm was a subsidiary of a group or multinational. The first draft of the questionnaire was prepared by the British team with a strong contribution from the author of this thesis. This draft was discussed and revised in two subsequent workshops, in Sheffield (April 2000) and in Halle, Germany (May, 2000). The final revised draft was ready for piloting in June 2000. Each country was free to add country specific questions to investigate certain aspects that were specific only to that country. In addition, each pair of countries working on the same sector could agree to joint marginal modifications linked to the specificity of the sector. The COPI survey is therefore composed of a harmonised questionnaire and of several national specific and sectoral specific versions of the questionnaire. The final

---

<sup>18</sup> It is in fact compulsory answering to questionnaires coming from Istat.

harmonised questionnaire, following modifications resulting from the piloting, was ready in November 2000.

The piloting of the machine tool questionnaire for Italy was carried out in two different firms in August 2000. As a result of the piloting, several questions were modified. In particular, several country specific questions needed to be added due to the small size of the firms and to the absence of listed firms. Questions on the relationship with outsider shareholders were therefore not applicable and other questions on the identity of the majority shareholders, their role in the firm, the percentage of shares and the existence of family links among the shareholders were added. In addition, in the harmonised questionnaire, not much stress was put on the type of relationship with customers and suppliers, especially suppliers of CNCs. A few questions were therefore added on these issues.

The questionnaire was sent out in November 2000 to 106 machine-tool producers. The sample was representative<sup>19</sup> and accounted for nearly a quarter of the whole population. The questionnaires were sent to the CEO or to the President, who were asked to answer section 1 or 4 and to distribute section 2 and 3 to the R&D director and to the Personnel director respectively. In order to find out the names of the CEO or President, each company was contacted by telephone over a period of 10 days. A pre-paid envelope with the return address was included with the questionnaire. We also included a letter explaining the purpose of the questionnaire and assured the confidentiality of the information provided by the respondents. The firms were asked to answer within 4 weeks. After 4 weeks only 1 firm had answered. All the other firms were contacted by phone. Around 50 of them said they were not interested in participating. The others asked to be sent the questionnaire again. This was done in December. More reminder phone calls were made during January and February. In February the questionnaire was sent again by e-mail or fax.

Of the 106 questionnaires there were 21 responses, giving a response rate of 19.8%. Given the small number of responses, no econometric analysis was carried out on these data. Instead, the data were used with other evidence to support some of the arguments made on the Italian machine tool sector in Chapter 7.

---

<sup>19</sup> The stratification variables have been the following: dimension both in terms of employment and of turnover, geographical localisation, and association with UCIMU.

### **3. The Italian system of corporate governance and sectoral specialisation**

#### **3.1 Introduction**

As explained in the first chapter, according to Tylecote and Conesa (1999, p.25) “variations in national systems of corporate governance (broadly defined) can help to explain national patterns of sectoral specialisation”. Each sector, according to the two authors, differs in the degree of *visibility*, *novelty* and *appropriability* of its innovations and different systems of corporate governance differ in their ability to cope with these characteristics.

In this chapter, we will first analyse the Italian system of corporate governance. Referring to the taxonomy of systems of corporate governance presented by Berglöf (1997),<sup>1</sup> we will explain why the Italian system is usually ranked among the insider systems. Moreover, in line with the underlying theoretical framework, we will try to determine the degree of *firm-specific perceptiveness* and *industry-specific expertise* of those who finance or could finance innovation. We will also assess the degree of *inclusion* of the stakeholders, investigating the type of industrial relations and the existing links between firms, their customers and suppliers.

Second, we will compare the current Italian industrial specialisation with that expected on the basis of the framework, extending to the Italian case an analysis that was made by Tylecote and Conesa (1999) for the American, British, French and German cases.

#### **3.2 *Firm-specific perceptiveness and industry-specific expertise***

*Firm-specific perceptiveness*<sup>2</sup> and *industry-specific expertise*<sup>3</sup> are two different types of knowledge on which an investor can base his/her investment decisions.

---

<sup>1</sup> See Chapter 1, Section 1.4.

<sup>2</sup> The ability to judge “whether the firm should be funded, and to monitor progress. In general, this perceptiveness needs to be firm-specific – the closer the acquaintance with that particular firm, the better; although no doubt a general knowledge of the industry will help too” (Tylecote and Conesa, 1999, p.27).

<sup>3</sup> “That is a good understanding of what is happening in the relevant technologies and markets across the sector” (Tylecote and Conesa, 1999, p.30).

The level of *firm-specific perceptiveness* depends on the type of relationship the investor has with the firm. An insider shareholder, a bank with a “relationship banking” tradition, and any type of investor that has had a close long-term relationship with the firm, is assumed to have a high degree of *firm-specific perceptiveness*. This type of perceptiveness does not coincide with the concept of insider knowledge, even if the latter implies the former, but it comprises also other types of knowledge. For example, an investor might decide to invest in a firm for its past history of successes or because he/she trusts the abilities and integrity of the management, without needing to have information about the particular technicalities of the investment project.

*Industry-specific expertise*, on the other hand, refers to the specific knowledge an investor has of the sector and to his/her ability to evaluate other aspects of an innovative project in addition to financial indicators. A clear example of high *industry-specific expertise* is that offered by the Californian venture capitalists and their in-depth understanding of the computer industry (See Manigart, *et al.*, 2000).

In this section, we will do the following. Firstly, we will refer to the structure of ownership and control to highlight the presence of insider shareholders. Secondly, we will study the type of relationship with banks and other financial institutions to check whether these have close long-term relationships with firms that could account for *firm-specific perceptiveness* or whether they appear to have invested in *industry-specific expertise*. Thirdly, we will focus on other forms of financing, analysing the type of expertise venture capitalists have of their target sectors, and the functioning of the stock exchange. In connection with the latter we will study the importance of equity capital in the financing of Italian firms, the functioning of the market for corporate control and the presence of short-term pressures that could reduce the amount spent on innovation. Fourthly, we will analyse the criteria followed by public agencies in deciding which private firms’ investment projects deserve to be financed. Finally, we will study the structure of public conglomerates and try to understand whether the state could be considered an informed shareholder and whether public managers had the necessary *firm-specific perceptiveness* and *industry-specific expertise* to choose the appropriate investments.

### 3.2.1 The main company organs

In the Anglo-Saxon tradition (outsider systems), the main focus of studies on corporate governance is usually on the structure and functioning of the board of directors. This is because the board is considered to be the most important instrument of control over the management and therefore a source of reduction of agency costs.

In insider systems, the board of directors does not have the same importance because insider shareholders have the power to control directly the management of their companies. The Italian situation is very similar to this latter system.

The Italian system is of the two tiers type. The board of directors (*consiglio di amministrazione*) has the function of ratifying decisions that have been previously taken by the controlling group, and is supplemented by a board of auditors (*collegio sindacale*), which is responsible for internal monitoring. The latter, however, cannot be compared to a proper supervisory board as its main duty is to safeguard corporate property, with respect to accounting issues, and it has no voice on strategic decisions.

The managing boards are usually composed of majority shareholders' representatives. The directors can either be executive or non-executive (the vast majority) and they are appointed by the shareholders' meeting, usually on suggestion of the President of the board and/or the majority shareholder. According to Barca et al. (1994a) in 90% of the cases, directors are chosen from among company employees or others who have close relations with the members of the controlling group. The assembly of shareholders can dismiss the members of the board with a simple majority. Board sizes average 12 members and this size increases with the scale of the firm. As suggested by Berglöf (1997), in insider systems the role of the board of directors is very limited, the meetings are not frequent and of poor quality and information is generally scarce and incomplete. As a matter of fact, according to Molteni (1997), in Italy the non-executive directors have serious difficulties in verifying the activity of the executive ones. This is not only because they cannot get access to such information but also because control would be perceived as breaking the implicit rules within the board. Even though board members and managers are supposed to use the "*agent's diligence*" in the management of the company, responsibility is effectively taken only in cases of insolvency or criminal acts. As shown in Table 3.1, along with the managing boards there are often many other managing units. As expected, the management of larger organisations requires a

larger number of managing units, with more decentralisation and delegation of responsibilities. This can be inferred from the fact that the percentage of firms with more than two managing units rises gradually from 21.7 for the smaller firms (up to 49 employees) to a maximum of 76.7 for the larger ones (more than 200 employees).

**Table 3.1 Managing units (%)**

Number of employees	Number of managing units					
	1	2	3	4	5	Total
20-49	43.3	35.1	18.6	3.1	0	100
50-199	21.1	22.6	40.6	15.0	0.8	100
>200	12.5	10.7	37.5	32.1	7.1	100
<b>Total</b>	26.9	24.5	32.5	14.3	1.7	100

Source: Barca et al. (1994a).

A peculiarity of the Italian system is the widespread diffusion of interlocking directorates, which consist of individuals with the position of directors in several companies. As reported by Ferri and Trento (1997), the average number of positions held by directors in listed companies was 14 in 1995, and the majority of them were established across companies belonging to the same group.

In general the chairman of the Board (Presidente) and the CEO (amministratore delegato) are two different people.<sup>4</sup> This should allow the independence of the Board, but more often than not, the chairman is also an executive director and one of the majority shareholders.

The board of auditors is composed of either three or five members (sindaci) who are to be chosen among certified public accountants (revisori contabili). The latter are elected by the assembly of shareholders and cannot be dismissed without cause before the end of the term. Listed firms are also subjected to external monitoring and sometimes the two forms of control overlap, giving rise to several problems of competence.

In the last few years, with the development of the Italian capital markets,<sup>5</sup> the presence of minority shareholders and of institutional investors has progressively grown stronger. This has made the role of the board of directors much more important as a form of protection of the interests of outsider shareholders. It is for

<sup>4</sup> The latest Code of conduct on corporate governance expressly suggests keeping these two figures separate. See Section 3.6.

<sup>5</sup> See Section 3.2.3.2.

this reason that the Draghi reform (D.Leb. 24<sup>th</sup> Feb. 1998, N. 58 )<sup>6</sup> and the new code of conduct for listed firms have paid so much attention to this company organ, to its independence and its transparency.<sup>7</sup>

### 3.2.2 The structure of ownership and control<sup>8</sup>

The structure of ownership is in Italy rather peculiar if compared to that of the other OECD countries. First, as shown in Table 3.2, financial institutions play a much more limited role than in most of the other countries. Banks, insurance companies, pension and investment funds own only 12% of the shares, a percentage well below the British, Japanese, American and German figures. Only in France, where 6.5% of the shares are owned, do financial institutions play a more limited role.

**Table 3.2 Direct ownership of listed companies in major industrial countries, (%)**

	Italy	United States	Japan	Germany	France	United Kingdom
<b>Financial Institutions</b>	<b>12.0</b>	<b>39.8</b>	<b>47.0</b>	<b>19.5</b>	<b>6.5</b>	<b>60.8</b>
Banks	10.9	0.3	25.2	8.9	4.3	0.9
Insurance firms	0.8	5.2	17.3	10.6	2.2	18.4
Pension funds	-	24.8	0.9	-	-	30.4
Other	0.3	9.5	3.6	-	1.9	11.1
<b>Non financial institutions</b>	<b>83.7</b>	<b>53.5</b>	<b>48.8</b>	<b>62.8</b>	<b>79.7</b>	<b>26.9</b>
Households	34.1	53.5	23.1	16.8	20.7	21.3
Non-financial enterprises	21.6	-	25.1	39.2	54.5	3.6
Public authorities	28.0	-	0.6	6.8	4.5	2.0
<b>Non residents</b>	<b>4.3</b>	<b>6.7</b>	<b>4.2</b>	<b>17.7</b>	<b>13.8</b>	<b>12.3</b>

Source: Barca, *et al.* (1994a).

Second, the role played by the domestic non-financial sector is far more significant than in the other countries (83.7%). Aside from the extremely large public enterprise sector (28.0%), a distinguishing feature is the widespread diffusion of shares among households (34.1%). Among other major OECD countries, only the US presents a higher percentage (53.5%). The importance of the non-financial

<sup>6</sup> This act was passed in 1998. It concerns the whole financial sector and, among others, financial brokerage activity, open-end and closed-end investment funds, and contains specific rules applying to listed companies. The Draghi reform has also introduced, for the first time in Italy, a complete set of corporate governance provisions. The reform and the implementing provisions by Consob (the controlling authority for capital markets and listed firms) and the Bank of Italy, had the main aim of bringing Italian firms and the Italian capital market into line with the more developed ones (e.g. in the UK and USA), progressively reducing the differences with these countries. See Section 3.2.5.

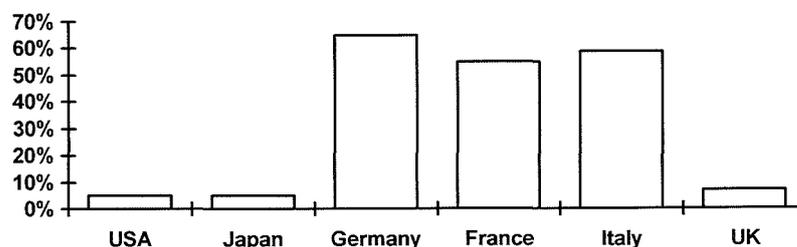
<sup>7</sup> The same act has also partially reformed the discipline of the board of auditors. The most important modification concerns the compulsory presence on the board of at least one representative of minority shareholders.

<sup>8</sup> This Section draws in large part from OECD (1995).

enterprise sector (21.6%) is largely due to the presence of group holdings and cross-holdings, both among firms belonging to the same group and across top holdings of different groups. Finally, foreign ownership is quite small by international standards (4.3%). This percentage however has been increasing in the last few years after the complete removal of capital controls in May 1990.

In line with the insider systems, Italy is characterised by a high concentration of ownership. Figure 3.1 below shows that single majority stakes account for nearly 60% of stock market capitalisation. Among the insider systems, only Germany has a higher concentration of ownership. In addition, Table 3.3 shows that when considering listed and non-listed firms with more than 10 employees, the controlling agent owns more than 80% of the company. This percentage increases to more than 90% if family links and voting agreements are considered and the percentage does not change considerably across all six classes of firms. Therefore, less than 10% of the capital of Italian companies is available to be exchanged on the market.<sup>9</sup>

**Figure 3.1 Largest Owners' share over 50%**



Source: OECD (1995).

Minority shareholders are estimated to hold financial claims in only a small number of listed firms (2% in 1994), especially in the motor vehicle and data processing sectors (OECD, 1995).

<sup>9</sup> The most updated data refer to 1994. Things have probably changed in the last few years with the improvements in the stock exchange.

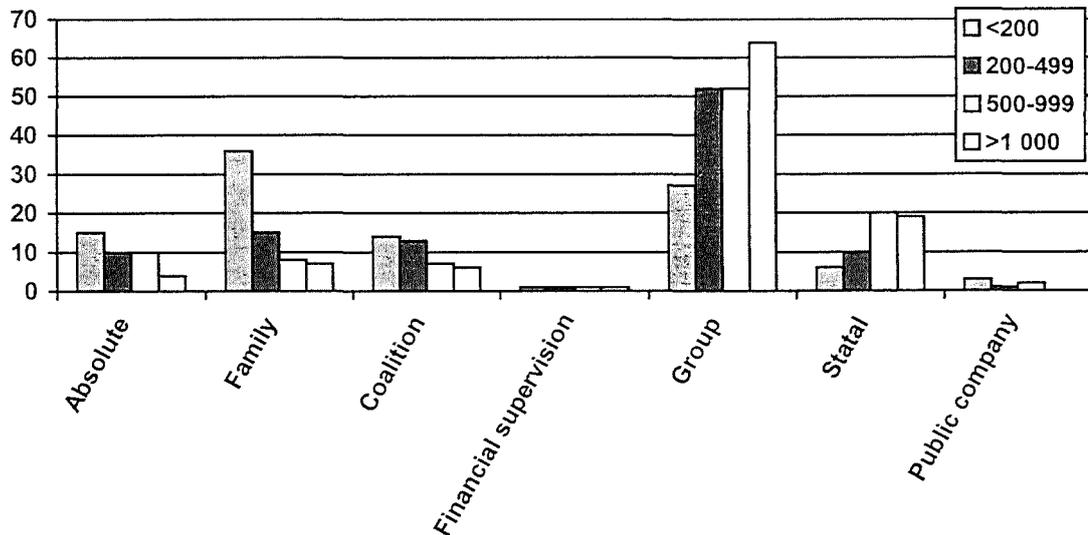
Table 3.3 Percentage of shares owned by controlling agent in manufacturing companies

Size classes (employees)	Controlling shareholders	Together with those linked by voting agreements	Together with relatives and those linked by voting agreements
11-49	87.24	93.0	94.5
50-99	86.62	93.0	94.4
100-199	86.04	91.2	92.9
200-499	88.05	92.8	93.9
500-999	90.81	93.7	93.9
1000-	88.49	92.0	92.0
Total	88.10	92.4	93.2

Source: Bianchi, *et al.* (1997).

In Italy there are several forms of control. The relative diffusion of each of them is shown in Figure 3.2.

Figure 3.2 Diffusion of forms of control in Italian firms according to firm size



Source: Barca, *et al.* (1994b).

- *Absolute control* is more widespread among smaller firms accounting for approximately 14.8% of the activity of manufacturing firms with less than 200 employees.
- *Family control* is much more widespread. This form allows a separation between ownership and control and it is based on family links among those in control or between the latter and the non-controlling shareholders. Nearly 40% of the firms with less 200 employees are controlled through this form. The percentage is much lower for larger firms.

- *Coalition control* is also common: links among shareholders are based on common values (shared within the same district, the same political party etc.), or on formal agreements. This model accounts for 11.6% of the shares of firms with less than 200 employees. The recent Draghi reform has disciplined rather strictly the use of this device.
- *State ownership* accounts for approximately 20% of the shares of firms with more than 500 employees. Firms owned by the state experienced an intense period of growth during the 1960s and 1970s. However, in the last 20 years they have met serious difficulties that are possibly linked to a failure of the “political market” which led to a failure of the governance system.
- The *Financial supervision* model is practically absent. The same is true for *Public companies*.
- *Indirect control* is exercised through the financial mechanism of the pyramidal group. High ownership concentration depends on the wide diffusion of this mechanism. Upstream firms along the chain of control, directly own majority stakes in “downstream” firms. In addition, any direct share holding in a firm also gives rise to an (indirect) shareholding in all those firms in which the former owns shares and this cascading effect increases the measured degree of concentration.

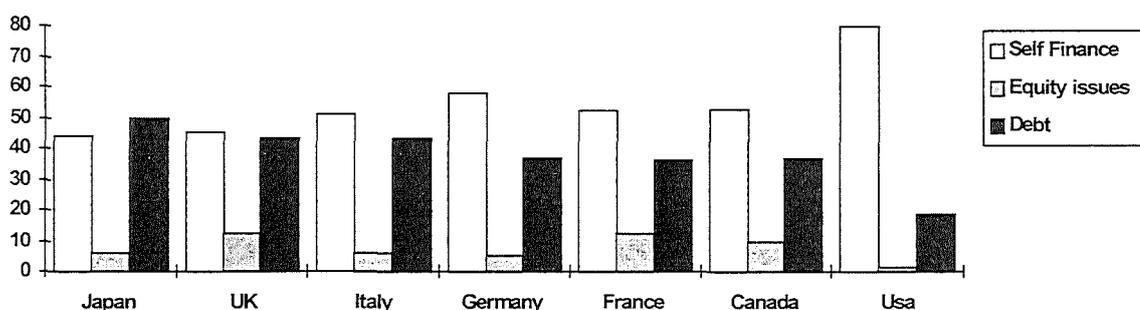
As the concentration of ownership is very high and mainly in the hands of individuals who are insiders, we can expect their *firm-specific perceptiveness* and *industry-specific expertise* to be rather high. However, given the limited dimension of most Italian firms we can also expect their internal capital not to be sufficient to finance R&D and, more general, innovative projects. Other sources of finance are therefore necessary and these can take the form of bank loans, equity capital, private capital or public funds. The degree of *firm-specific perceptiveness* and of *industry-specific expertise* of external investors, are therefore the issues considered next.

### 3.2.3 Structure of corporate finance

As it is shown in Figure 3.3, internally generated funds provide in Italy most of the investment capital to firms, as in any other European country, but their share in

total financial resources is on average lower than in the rest of continental Europe.<sup>10</sup> Bank loans are the most important external sources of finance and although the leverage has converged to the OECD average in the last 15 years, it is still the highest after the Japanese one.

Figure 3.3 Corporate financial structure 1989-1992



Source: OECD (1995).

The high degree of leverage in Italy is due to several reasons. Firstly, as in many OECD economies borrowing in Italy enjoys a clear fiscal advantage over equity. In 1994, the after tax return for each lira of profits was 0.8 lira when financed through debt as against 0.45 lira when the investment was financed through retained earnings or equity (OECD, 1995).<sup>11</sup> In addition, extensive government intervention during the 1980s lowered and dispersed the costs of corporate distress, this way reducing the risk premium on bank loans.<sup>12</sup> The fear of losing control over firms is another factor that has played an important role in restraining owners from stock market listings. The same reason is also at the base of the widespread diffusion among listed firms of dual-class shares deprived of voting rights. Finally, raising money on the market could also be more costly because of the low protection granted to minority shareholders<sup>13</sup> who are perfectly aware of the opportunistic behaviour of the majority shareholders.

<sup>10</sup> The data refer to the year 1992. In the last few years the proportions have probably changed but the OECD does not have more updated data.

<sup>11</sup> Since July 1998 taxes on capital gains have been simplified and this facilitates the choice among different financial instruments.

<sup>12</sup> Empirical support for these explanations of high leverage ratios in Italian firms is provided by Bonato, Hamaui and Ratti (1991).

### 3.2.3.1 Bank-firm relations and corporate governance

Due to the bank law of 1936 (R.D.L. 12 March 1936 n.375 converted in law 141/38), until 1993 Italian banks were not allowed to own equity shares in non-financial firms, as it was possible at the beginning of the century, when there was in Italy a much stronger integration between banks and firms. In fact, as extensively reported by Barca and Trento (1997), German style universal banks initially provided the massive infusions of capital needed to reduce the gap between Italy and the first movers in the process of industrialisation. At the same time, industrial firms also owned equity shares in these banks causing several problems of conflicts of interest. The crisis of 1930s ended that experience. Mixed banks were salvaged by state intervention. The banking law of 1936 introduced a difference between banking institutions in the short-term sector (up to 18 months), with no right to own shares in non-financial companies (*aziende di credito*) and those operating beyond the short-term period, that were allowed to intervene in the client firm's equity capital (*istituti di credito speciale*).

Until 1992, public banks (*casse di risparmio*, ex *istituti di diritto pubblico*, *banche di proprietà pubblica*, etc.) dominated the banking sector. These accounted for about 60% of total employment, 90% of total financial investment and 80% of total deposits. Few ordinary credit banks, the majority of special credit institutions (public agencies, joint companies controlled by the state or public holdings) and the vast majority of saving banks (*Casse di Risparmio*) were controlled in some way by the state. The state also controlled the so-called public-law credit institutions like *Banca Nazionale del Lavoro*, *Banca di Roma* and two other big credit institutions, namely *Credito Italiano* and *Banca Commercial Italiana*. These institutions played an important role in the financing of public enterprises and in general they demonstrated a good capacity for making profits.

During the 1990s the process of privatisation of public banks and that of consolidation completely changed the structure of the Italian banking system. Various mergers and acquisitions have considerably increased the dimension of Italian banks, the largest of which, until two years ago, did not rank among the first 50 banks in Europe (The Economist, 1999). Currently, *Banca Intesa*, the largest Italian group, born from the merger of *Cariplo* and *Ambroveneto* and the acquisition

---

<sup>13</sup> See next sections.

of Banca Commerciale Italiana, ranks among the first ten in Europe. Gruppo Unicredito, the second largest group in Italy, born from the merger of Credito Italiano and Rolo Banca, ranks among the 15 largest European banks.

Because of the predominant role played by credit institutions in corporate external financing and little development of corporate financial markets, Italy has conventionally (but perhaps not accurately) been grouped with bank-based systems, such as Germany and Japan. However, in contrast with those systems bank-firm relations have been weak in Italy and much closer to the arm's length type of the US and UK than to a relationship kind of banking. Thus the system is insider dominated but not relational so far as banking goes. A study of the banking sector by Capra, *et al.* (1994) uncovered several facts that in addition to the prohibition of owning equity shares in non-financial firms were keeping low the incentives for banks to get involved in the corporate governance of Italian firms.<sup>14</sup> As shown in Table 3.4 Italian firms tend to borrow from several banks (each lira lent in 1987 was granted on average by 21 banks and by 14 in 1994). The situation has been progressively improving over the years and, especially for the larger loans (50 billion or over), the number of lenders has been reduced. At the same time, as Italian banks are rather small, it might be that this phenomenon is due to a reduced credit granted by each bank, which drives the firms to get loans from different lenders.

**Table 3.4 Average number of lenders per non-financial firm**

Size class of loans	1987	1990	1994
0-0.08 billion lire	2.1	1.9	2.0
0.08-0.25 billion lire	1.2	1.2	1.2
0.25-0.5 billion lire	1.9	1.8	1.8
0.5-1 billion lire	2.8	2.6	2.5
1-5 billion lire	4.8	4.3	4.0
5-10 billion lire	8.3	7.4	6.5
10-50 billion lire	12.5	10.8	9.2
50-200 billion lire	21.5	18.7	14.9
200 billion lire and above	44.9	36.1	26.4

Source: Ferri and Pesaresi (1996).

Firms also tend to change their lenders quite often, which makes co-operative arrangements among the lending banks very difficult. In addition, as illustrated in Table 3.5, as many as 84.3% of the loans take the form of overdrafts and advances. These allow banks to call back their loans in case of firms facing bad times, which

<sup>14</sup> Since 1987 commercial banks could hold shares in non-financial firms through separate banks subsidiaries.

does not provide a strong incentive to monitor the activity of the firm. In particular, it seems that when a firm undergoes a temporary crisis, banks are very rarely involved in the financial restructuring of the firm and do not usually suggest new managers or a share capitalisation restructuring.<sup>15</sup>

**Table 3.5 Commercial bank loans to non-banks according to type of contract. December 1992**

Bills on hand	Current account overdrafts	Current account advances	Mortgages	Total
3.9	61.9	22.4	11.8	100

Source: Capra, *et al.* (1994).

Moreover, the legal subdivision between short-term and long-term lending has caused a fragmentation of the information available to commercial banks and special credit institutions. Not only do banks not build up strong relationships with firms but they do not even collect data concerning the structure of ownership. As shown in Table 3.6, in 93.1% of the cases, banks do not learn about ownership changes at the beginning of the operation and in most of the cases they learn about it only after it has taken place. Very few banks get informed about the operation when the owner has decided to sell the firm or during the bargaining.

**Table 3.6 When do banks learn of ownership changes at borrowing firms?**

	Inception	When owner decides to sell	During bargaining	When contract is signed	After
Almost never	93.1	57.7	38.6	36.4	18.7
Less than 1/3 of the cases	5.6	37.7	52.5	50.5	21.6
1/3 to 2/3 of the cases	1.0	3.0	4.6	10.5	23.3
More than 2/3 of the cases	0.3	1.6	3.0	2.3	17.4
Almost always	0	0.7	1.3	0.3	19.0
Total	100.0	100.0	100.0	100.0	100.0

Source: Capra, *et al.* (1994).

Finally, the widespread practice of loan collateralisation (See Table 3.7) even if it could provide information concerning a debtor's equity, therefore helping the assessment of debtors, it could put less pressure on banks to exercise an active monitoring role. Loan collateralisation is typically 100% by special credit institutions. Commercial banks require full collateral in 32.5% of the cases and

<sup>15</sup> This on the other hand causes very few problems of short-termism as attested by Brunetti and Cescon (1998).

partial collateral in 15.7%.<sup>16</sup> At commercial banks collateral is mainly personal, and only in a much smaller percentage real.

**Table 3.7 Commercial bank collateralisation of loans. December 1992**

Extent of collateral backing			
Full collateral	Partial collateral	No collateral	Total
32.5	15.7	51.8	100.0
Type of collateral backing			
Real	Personal	Other	Total
32.6	61.1	6.3	100.0

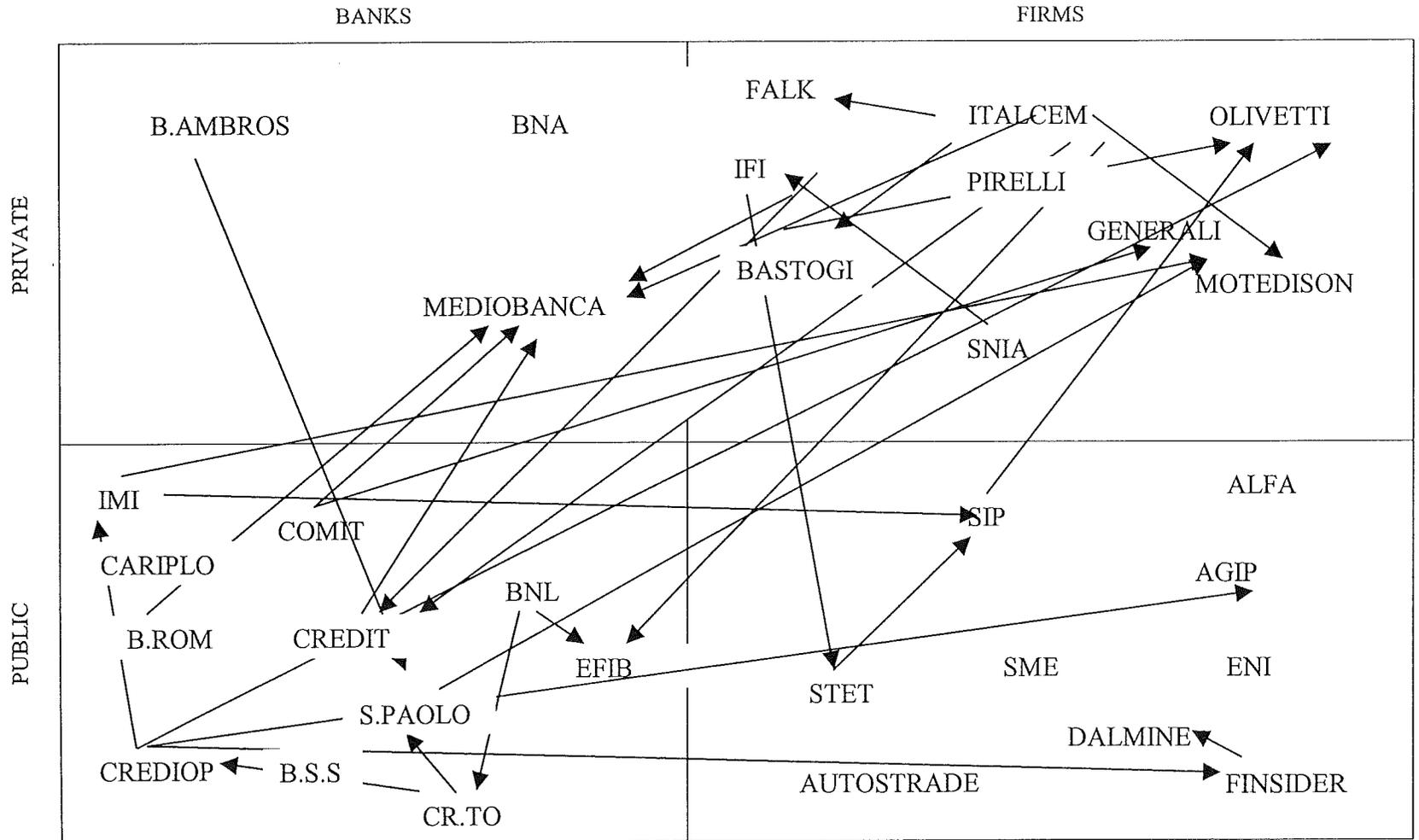
Source: Capra, *et al.* (1994).

The study by Capra, *et al.* (1994), therefore, seems to suggest that Italian banks did not have many incentives to invest in *industry-specific expertise*. As a consequence they could not be of any help for small start up firms in high technology/high *novelty* sectors. In addition, due to the short-term/arm's length relationship with firms, they also did not have a strong *firm-specific perceptiveness*, which means that they also could not play an important role in sectors characterised by low *visibility*. Very recently, however, it has been shown that, at least for the case of large firms, particular forms of long-term links, which were not based on equity shares, but on interlocking directorates and on trust, were in place and functioning. Ferri and Trento (1997) found that the percentage of interlocking directorates between banks and private firms accounted for an average of 45% of the total number between 1950 and 1995. For example, Giovanni Agnelli who was the president of IFI, the financial holding controlling the Fiat group, was also involved with Montecatini, Montedison, Bastogi and with Mediobanca and Credito Italiano.

Figure 3.4 illustrates the net of interconnections based on interlocking directorates between public and private banks and firms in 1990. The darts represent *hierarchical interconnections*, and go from the firm or bank where the director had a more important office to the firm or bank where the office was less influential. The net of interconnections is particularly complex between public banks and private firms. In addition, a private merchant bank, namely Mediobanca, appears to have had a large set of interconnections both with private firms and with public bank.

<sup>16</sup> Commercial banks operate can only credit loans up to 18 months, usually for much smaller amounts.

Figure 3.4 Interlocking directorates in 1990. Source: Ferri and Trento (1997)



Mediobanca was established in 1946 with the aim of boosting the reconstruction after the war and it has been the most active in relationship banking.<sup>17</sup> Since its set up, it progressively acquired stakes in all the largest Italian industrial and insurance groups (placed mainly in the Northern regions) and had a strong involvement in their controlling coalitions. On the other hand, since 1987<sup>18</sup> many Italian groups and several foreign banks have had equity shares and a seat in the governing bodies of Mediobanca. This, therefore, has operated as a sort of clearinghouse and repository for all the interwoven shareholdings in key private enterprises. The wide networks of equity linkages of Mediobanca with industrial firms, banks, insurance companies and financial companies are shown in Figure 3.5. The managers and large shareholders controlling this immense and articulated network of firms composed the well known “salotto buono”, where in a typical Italian way of doing business, strategic alliances were set up and other relevant decisions were taken.

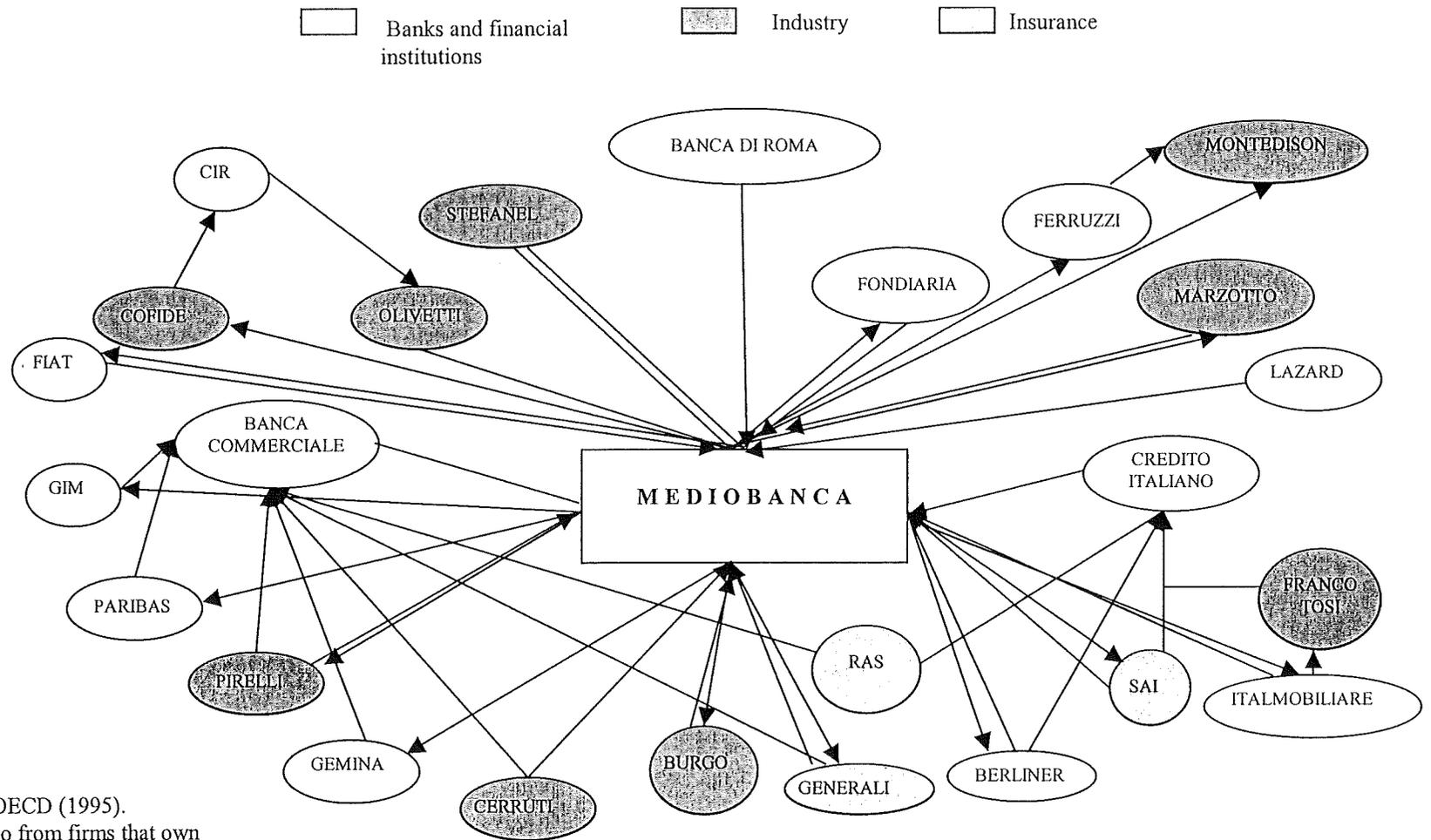
Mediobanca has also been active in formulating long-run financial strategies, co-ordinating financial support and monitoring and favouring mergers and acquisitions. All major reorganisations (for example the merger between Montecatini and Edison and that between Pirelli and Dunlop) in Italian corporate history and most debt rescheduling have seen the involvement of this bank. Its activity has been widely supported by three important commercial banks (Banca Commerciale Italiana, Credito Italiano and Banca di Roma), which have collected large amounts of capital for Mediobanca, selling certificates of deposit through their branch network.

---

<sup>17</sup> Also IMI developed wide-ranging merchant bank activities, but it was specialised in assets management and it has rarely been involved in corporate governance and mergers and acquisitions.

<sup>18</sup> Mediobanca was a public bank until 1987 when it was partly privatised. After that the state kept a stake of 25%, another 25% was bought by a stable core of Italian and foreign investors, and the remaining 50% was bought by smaller shareholders.

Figure 3.5 The role of Mediobanca



Source: OECD (1995).  
 Arrows go from firms that own the equity shares to those that are participated.

In the last few years, however, the role of this merchant bank has progressively faded away. In fact, even if in 1999 it acted for Olivetti's takeover of Telecom Italia and succeeded in blocking the attempted takeovers by Unicredito Italiano of Banca Commerciale Italiana and by SanPaolo IMI of Banca di Roma, the role of the bank has now become almost irrelevant and other Italian and foreigner merchant banks are taking its place. "In the past, Mediobanca twisted the arms of Italy's commercial banks to persuade them to finance its shareholder-clients. But Mediobanca and its network are no longer the only sources of capital, so the value of being a friend of the bank has been much diminished" (The Economist, 2000a).

According to Conti and Ferri (1997) local banks have instead played a determining role in the development of industrial districts. In particular, it seems that between local banks and small firms the division decreed by the bank law never took place. Most of the time, those who were in charge of deciding whether to grant a bank loan or not were also those who were applying for the loan. In addition, this type of long-term relation helped the banks to accumulate considerable experience in the sector.

For example, when we interviewed the general director of Banca di Credito Cooperativo di Manzano, the bank of the Chair District, he declared that not only did his bank finance the purchase of innovative machinery and investments in R&D, but very often it also offered consultancy services on the merit of the investment. These kinds of relations were important not only for firms, which did not suffer from particular financial constraints but also for banks. On the one hand, they could take advantage of their *firm-specific perceptiveness* and *industry-specific expertise*, and on the other they enjoyed a particular position of monopoly in their territory.

Following the EC harmonisation of Banking Law, the Italian banking system is now moving back to a model of universal banking very close to the one operating before 1936 (See D.L 1/9/1993 n.385 T.U.). Banks are now allowed to invest part of their capital in shares of non-financial companies<sup>19</sup> and to engage directly in activities such as leasing, factoring and merchant banking. It is still too early to see any considerable change but the acquisition of shares by banks (Italian and not) may

---

<sup>19</sup> The percentages depend on the capital of the bank and on that of the participated firms.

lead to a deeper monitoring involvement in business strategies and to a closer relationship also with small-medium firms outside industrial districts.<sup>20</sup>

To conclude, in general Italian banks do not appear to have invested in *industry-specific expertise*, with the exception of local banks within industrial districts, which means that they could not cope with high *novelty*. On the other hand, their degree of *firm-specific perceptiveness* also does not appear to have been sufficiently high to cope with low *visibility*. In fact only Mediobanca, those banks that developed a particular close relation with large firms due to interlocking directorates and a few local banks within the industrial districts appear to have carried on a relationship type of banking.

### 3.2.3.2 The Italian equity market

One of the characteristics identified by Berglöf (1997) to describe insider systems is the low dimension of capital markets. The Italian Stock Exchange, in line with those of the other continental European countries, has always been rather small in comparison to the Anglo-Saxon countries where the stock market is one of the major corporate finance sources.<sup>21</sup> However, in the last few years, the Italian Stock Exchange has been progressively growing. As

Table 3.8 shows, in terms of capitalisation it is now the fifth largest Stock Exchange in Europe after London, Paris, Frankfurt and Zurich.

**Table 3.8 Number of Listed Companies by Country, capitalisation at the end of 2000, and newly listed companies in 1999**

Country	Capitalisation (in millions of Euro)	N. Listed Companies	Newly listed companies in 1999
France	1,639,726	1186	119
Germany	1,454,316	968	183
Italy	818,384	242	36
Holland	735,229	384	23
Switzerland	832,674	417	19
UK	3,069,747	2980	187
NYSE	13,333,641	3025	151

Source: Federation of European Stock Exchanges (2001).

<sup>20</sup> This is even more probable now that the Draghi reform has reintroduced proxy voting for banks and other financial institutions after it had been abolished in 1974.

<sup>21</sup> For example in 1979 the number of companies listed on the London Stock exchange was 1565 whereas the number in Milan was 145. Ten years later in London the number had gone up to 1720 and in Milan to 235.

In the last 25 years the Italian Stock exchange has undergone a huge increase in scale (See Table 3.9). Listed firms have grown by 88 reaching a number of 242 at the end of 2000. The market capitalisation has gone up by more than 212% and now accounts for more than 70% of GDP (5.4% in 1975 and 13.8% in 1990). In addition, during the second half of the 1990s also the quality of listed companies has changed with an increase in the number of medium and small sized firms not belonging to groups and of foreign companies.

Table 3.9 Main Indicators (Main market -figures in billion of lire)

	Listed companies	Capitalisation Italian companies		Turnover value		Turnover ratio	New capital raised	Mib index yearly return
		Millions of Euro	% of GDP	Total	D. avg			
1975	154	3835	5.4	1 119	5	15.1	230	-5.1
1980	141	18228	6.0	7 343	29	43.5	3 004	122.1
1985	161	54786	12.1	26 315	104	35.6	4 035	98.5
1990	229	94333	12.8	50 700	204	26.4	9 408	-25.1
1991	231	99081	12.4	31 057	126	17.9	4 854	-2.2
1992	229	95781	11.5	34 649	136	19.7	3 027	-11.7
1993	222	128470	15.1	103 554	406	50.8	16 192	37.4
1994	223	155811	17.9	190 009	754	72.0	15 058	3.3
1995	221	171668	18.4	140 341	561	45.3	8 689	-6.9
1996	217	202732	20.6	156 521	621	44.0	3 045	13.1
1997	213	314720	30.8	337 548	1 345	68.5	7 933	58.2
1998	223	485187	45.4	466 567	3 733	106.7	16 035	40.96
1999	247	726566	65.6	-	-	-	-	-
2000	242	818384	70.2	-	-	-	-	-

Source: Borsaitalia (2000).

The large improvements of the last few years are the result of a mixture of factors. The decrease in interest rates in connection with Italy joining the EU has increased the appeal of equity investments. The privatisation process has increased the amount of shares on the stock exchange. The recent revolution of the banking sector (See Section 3.2.3.1) has favoured a more active role of credit institutions in the acquisition of shares. The Stock Market law of January 1991 (Law n. 1/91, now substituted by the Draghi reform) reformed the legal functioning of the securities market and introduced a new type of multi-functional investment firm (SIM) with the exclusive right of trading in organised security markets. The settlement system was modernised in successive steps and in 1995 the cash settlement was introduced. Since 1994 trading has become fully 'on screen'. Finally the Draghi reform of 1998 made OPA (*offerta pubblica di acquisto* or take-over bid) compulsory for any

shareholder who reaches 30 per cent of the capital of a firm, which represented a first important step in the direction of a much stronger protection of minority shareholders.<sup>22</sup>

Notwithstanding the recent growth in the Italian Stock Exchange, there is still much scope for further improvements from the point of view of efficiency. Recently, Pagano, Panetta and Zingales (1996) have studied the costs and benefits of going public in order to understand the reasons why many Italian firms might still prefer not to sell their equity on the stock exchange. Among the benefits of going public seems to be that it enables firms to borrow more cheaply. In fact, around the IPO (Initial public offering) date, the interest rate on their short-term credit falls and the number of banks willing to lend to them rises. This probably happens for three reasons: listed companies may become safer borrowers because they reduce their leverage; more information is publicly available so that lenders spend less to assess their creditworthiness; finally, stock exchange listing offers an outside financing option that curtails the bargaining power of banks. Among the costs, one is that the tax burden increases considerably around the date of the IPO, presumably because public companies are more visible to tax authorities. Given the high level of tax evasion in Italy, especially among small and medium-sized business, the greater visibility to tax authorities may help explaining the low propensity of Italian companies to go public.

The consistent growth in the stock exchange over the last few years has already started to generate beneficial effects. In fact, as it will be explained in the next few sections, the increased liquidity of the stock exchange has favoured the development of the venture and private equity capital markets, it has attracted capital from abroad and it will certainly favour the development of investment funds and other institutional investors. Italian firms, therefore, will be able to rely more than ever before on external finance capital for their investment projects. At the same time they will need to become more transparent and to improve the relationship with the investors. As mentioned by the Economist (1998b): "In anticipation of the euro, institutional investors are already starting to allocate their European equity portfolios by sector, rather than by country, and they will compare the quality of information provided by listed firms. 'Money flows towards transparency', says John Andrew, a

---

<sup>22</sup> See next section.

director of Schroder Italia SIM, a securities house. Italian firms are starting to grasp that, if they fail to unmask, they will lose ground to foreign rivals". As it will be explained in the last section of this chapter, a new code of corporate governance and a new law on financial markets and listed firms are playing an essential role in bringing Italy up to European standards. The performance of the stock exchange is one of the direct results.

### **3.2.3.3 Financial institutions**

After the Great Crash of the 1930s no other financial institution took over the role of banks in the ownership structure of Italian companies. Pension funds, insurance companies, open and closed end funds, all together in 1992 owned only 1.4 per cent of the total stock market capitalisation. This situation was the result of a combination of different elements ranging from the weakness of the stock market, to the fiscal burden, to the low transparency of fiscal rules and corporate information. In particular, the development of pension funds has been delayed both by the "country's broad-coverage, pay-as-you-go public pension system" and by the growth of government deficit (financed by government bonds) (Barca and Trento, 1997). The role of these institutions is likely to increase in the next few years thanks to the adoption in 1993 of new legislation (DL 1993/124). This regulates and promotes them with a more generous tax regime, but it is certainly not going to be central before the next decade. However, in comparison to other European countries, the amount of resources invested in Italy in share subscriptions of non-financial firms by financial institutions is still very small.

### **3.2.3.4 The venture capital market and the "*Nuovo mercato*"**

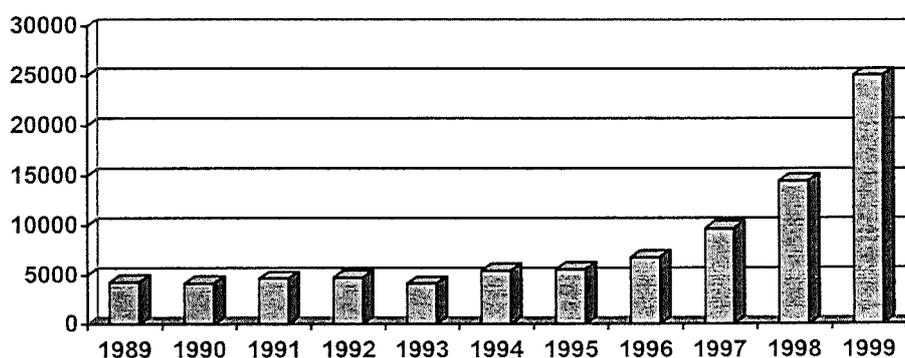
A couple of years ago the Economist (1998a) stated that: "The industry seems to be shaping up at last. Suddenly, Europe is awash in venture capital [...] One explanation is that Europeans are increasingly eager to invest in equities. Europe's myriad growth-company stock markets now provide a handy means for venture capitalists to cash out as their investments mature, so encouraging them to invest more in young firms. Stock exchanges in Britain, France, Belgium, the Netherlands and Ireland all have launched small-company markets. [...] These markets are

sizzling.”

As it can be seen in Figure 3.6, the dimension of the European venture capital market has in fact increased consistently since 1996. Compared to 1998, total funds raised in 1999 increased by 20.19% - from € 20.3 billion to € 24.4 billion, with total investment up 74% from €14.5 billion to € 25.1 billion.

The European Private Equity and Venture Capital Association (2000) reports that buy-outs and expansion are still the largest investment stages in terms of amount invested, but the amount committed to start-up investments increased by 89% in 1999. Funds raised for investment in high-technology companies at the early and expansion/development stages, almost tripled in one year, from € 2.9 billion in 1998 to € 8.4 billion in 1999. Banks and pension funds were the two largest sources of capital, contributing 29% and 19% of the total respectively. Insurance companies increased their contribution to total funds raised, from 9% in 1998 to 13% in 1999. Within Europe, Britain has the leading position, accounting for € 9.9 billion (39%) of total funds raised and € 11.5 billion (46%) of the total invested. France and Germany follow with respectively € 4.3 billion (17%) and € 3.8 billion (15%) of total funds raised and € 2.8 billion (11%) and € 3.2 billion (13%) of total funds invested. Denmark, with an increase of 267%, Switzerland (170%), Iceland (156%) and Germany (103%), all more than doubled the funds raised.

Figure 3.6 Annual European Private Equity Investment (€ million)

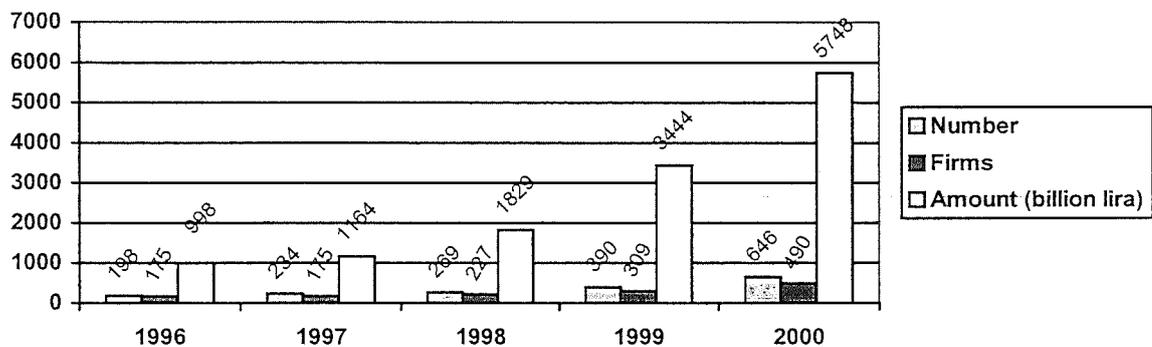


Source: EVCA (2000).

In Italy the first operations of venture capital were made at the beginning of the 1980s. The Italian market of venture capital is therefore very young if compared

to those of the other advanced economies. However, in line with the other European countries, also the Italian market has undergone a consistent development in the last two or three years. As it is shown in Figure 3.7, the members of the Italian venture capital association have increased from 34 in 1996 to 71 in 2000. The total amount invested increased by 214% between 1998 and 2000, reaching a level of 5,748 billion lira (€ 2.96 billion). In the same year the number of operations financed was 490. As many as 50% of the operations concerned firms with less than 100 employees even though the amount invested in these firms represented only 24% of total investments.

**Figure 3.7 Private Equity investments. Number of operations, number of firms and amount invested**

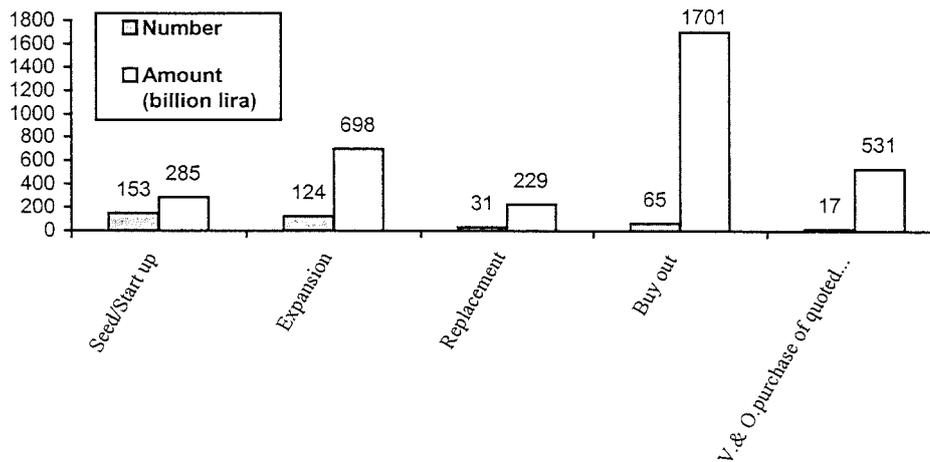


Source: Aifi (2000).

In 1999 the largest amount of investments went towards buy-outs (50%) but start-up projects were the most numerous (39%) (See Figure 3.8).

Until 1993, Italian banks with specific requisites were allowed to purchase shares of other firms only through a subsidiary. Since 1994, however, banks have been allowed to acquire directly minority shareholdings in companies. Since 1998, the number of Italian banks playing a leading role in the private equity market has sharply grown. As shown in Figure 3.9, banks and their subsidiaries accounted for approximately 25% of raised funds. They are particularly active in expansion and replacement financing. Investment companies, both private and those linked to large corporations, also play a very active role. In particular, especially in the last 5-7 years, they have developed deeper skills and expertise, through investments in shares or by supplying advisory or brokerage services (Aifi, 1999).

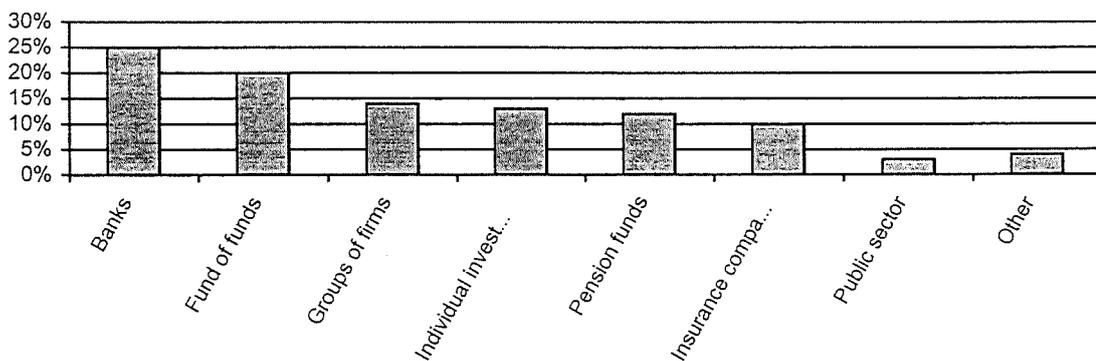
Figure 3.8 Fund Distribution by Stage of Investments 1999



Source: Aifi (1999).

Pension funds and insurance companies also played an important role. The public sector, which until few years ago was one of the major financiers, seems to have reduced its investments in the private sector. Public players operate mainly at the start up level and their activity is mainly dedicated to promote new entrepreneurship and to finance the Italian economic growth.

Figure 3.9 Origin of the funds invested



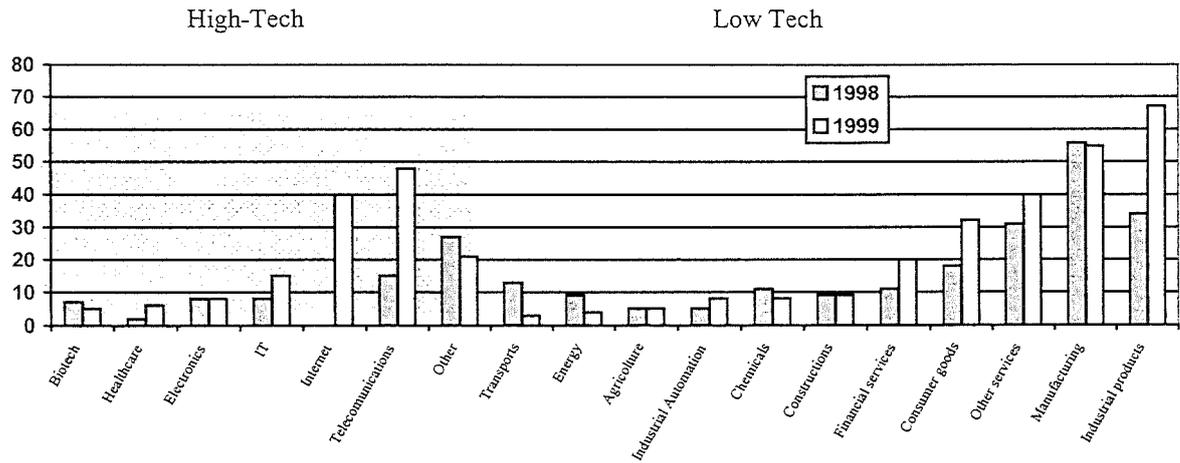
Source: Aifi (1999).

The services provided are the normal ones: early stage financing (seed financing, start up financing and first stage financing), expansion financing (second-stage financing, third-stage financing, bridging financing) and management financing (management buy-out financing, management buy-in financing and family buy-out financing). Moreover, venture capitalists also grant long-term loans and offer

consulting services.

As for the sectoral distribution of investments, manufacturing industries are those which obtain the largest amount of funds (See Figure 3.10). However, in line with the rest of Europe, in the last three years also the amount spent in high-tech sectors has considerably increased.

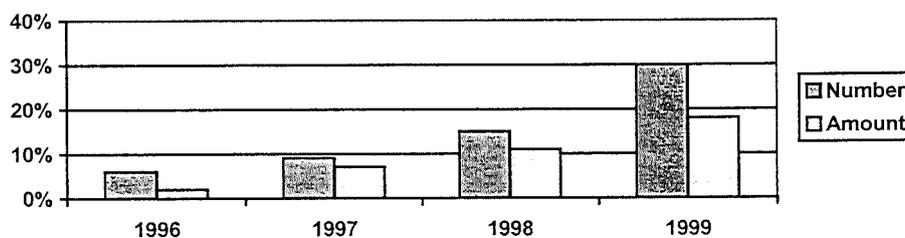
**Figure 3.10 Sectoral distribution of investments in 1998-1999**



Source: Aifi (1999).

As it is shown in Figure 3.11, in comparison to 1998 the percentage of operations in high-tech industries has doubled and in 1999 it accounted for 30% of the total number of operations and 18% of the amount invested. This is however still lower than the European average. Within the high-tech industries, the largest amount was invested in telecom (carriers) and in Internet related business.

**Figure 3.11 Percentage of investments in high-tech firms. \*Includes: communications, information technology, electronics, biotechnologies, and healthcare**



Source: Aifi (1999).

One of the reasons for the high growth of the venture capital market is probably the launching of the new stock market for SMEs, the *Nuovo Mercato*. Its rapid development and excellent performance have consistently increased the exit opportunities of investors, thereby stimulating venture capital and private equity investments.

**Table 3.10 The European markets for small and medium firms in 1999**

Market	Number of firms	Capitalisation (mil. €)
Italy	27	26,610
Belgium	16	458
France	151	34,638
Germany	318	182,943
Holland	15	1,356
Easdaq	62	47,839

Source: Borsa Italia (2000).

The *Nuovo Mercato* was opened in June 1999. Its main goal is to respond to the financial necessities of small and medium sized firms that want to grow. Its main target are innovative firms, active in high-tech sectors or in traditional sectors but with innovative products, processes or services. With its current 27 firms and € 26,610 mil, *Nuovo Mercato* is the third stock market for small and medium sized firms in Europe (Table 3.10), after Germany and France. Its performance has been very good. Two of the listed firms have been among the ten best performing firms of 2000 in Europe. One of these, Tiscali, since its listing last year grew by 770%. The annual index of the market gained 8% from the beginning of 2000, which is higher than the rates in Belgium (5.76%), Germany (6.58%) and the Easdaq (-17.45%).

The data seems to suggest that, in the last few years, Italian venture capitalists have been investing in *industry-specific expertise* related to the high technology sectors. Therefore, even if up until now there was not any type of support in Italy for operating firms or new start up firms in sectors characterised by a high degree of *novelty*, things are now starting to change and also in Italy these sectors might undergo an important development.

### **3.2.3.5 The importance and diffusion of pyramidal groups**

As reported by Berglöf (1997), insider systems make extensive use of instruments for separating ownership and control. Also in Italy, there is a widespread diffusion of one of these instruments, namely the organisational form of the *group* of

firms. This form has a long history in Italian industry. Already in the 1950s, Ifi, the financial holding of the Agnelli family was at the top of a pyramid of around 180 firms and the Edison group embraced 97 companies. The major expansion, however, took place in the second half of this century, especially during the 1970s and 1980s. In the post war period, the high inflation, the facilitations granted by the state, and the unexpected and uncommon growth, allowed firms to self-finance their own investments. Therefore, in the first two decades after the war, Italian firms did not suffer enormously from the divorce from the bank system that took place in 1936. With the crisis of the 1970s and 1980s, however, self-financing became insufficient and Italian firms, especially the largest ones, started to rely more than ever before on the market.<sup>23</sup> The *group form* became the best instrument to avoid loss of control and at the same time to collect capital both in the form of equity shares and bank loans.

Currently, group membership is widespread among firms of all sizes, but it is still more common among large firms. Nearly all manufacturing firms with more than 1000 employees belong to groups (the vast majority of listed companies do), and so do over 30% of firms with size ranging between 50 and 100 employees. According to ISTAT (1994) (Italian Centre for statistical studies), in 1991 87% of firms with more than 500 billion lira sales had equity stakes in other firms. At that time 151 groups in Italy with at least one listed firm, were controlling almost 6,500 firms.

Groups of firms can take two main forms (Goto, 1982).<sup>24</sup> The A-type associative groups, typical of Japan consist of a number of firms, with basically equal power, connected through a network of cross-shareholdings. The coordination of activities in this type of groups is secured through more or less informal mechanisms, information exchanges and tacit rules of conduct. The B-type hierarchical groups, which prevail in Europe, instead, centre around a parent holding company. They are essentially characterised by a pyramidal structure and monitoring and decision-making are organised hierarchically.

In Italy groups take the B-type hierarchical form. Equity linkages are vertical and unidirectional: a financial holding company controls (either directly or indirectly) all firms belonging to the same group. Reciprocal shareholdings are quite

---

<sup>23</sup> This is also the period when Mediobanca becomes progressively more important.

<sup>24</sup> For a comprehensive study of Italian groups of firms see Buzzacchi and Colombo (1996).

common between different groups, offering scope to establishing mutual influence,<sup>25</sup> or to diversify portfolios. In general, a holding company controls, through the chain of equity shares all the firms belonging to the group with a minimum amount of capital invested. For example, in a four level pyramidal group, the last-level subsidiary can be controlled with as little as 7% of shares, if each intermediate subsidiary owns 51% of shares in the firm at the following levels. On average, the top shareholders of private non-financial groups control seven lira of capital for each lira invested in equity. For example, as it can be seen in Table 3.11 in the Berlusconi group the top shareholders control 3.66 lira of capital for each lira invested. The leverage is even higher for the Agnelli group, where each lira of capital controls 8.86 lira of capital invested.

**Table 3.11 Degree of separation between ownership and control**

Degree of separation of ownership and control	
1. De Benedetti Carlo	10.33
2. Giovanni Agnelli & C S.a.p.a	8.86
3. Pininfarina Sergio	5.93
4. Ligresti Salvatore	4.83
5. Compart S.p.a.	4.35
6. Radici Pesenti Rosalia	4.15
7. Berlusconi Silvio	3.66
8. Pirelli	1.95
9. Bulgari S.p.a	1.80
10. Tanzi Calisto	1.68
11. Benetton	1.46
12. Bosatelli Domenico	1.39

Source: Consob (1996).

Through the mechanism of the group form, hostile take-overs, and undesired changes in management, are nearly impossible.<sup>26</sup> Family and coalition control is perpetuated generation after generation.<sup>27</sup> Moreover, minority shareholding can be used at all levels of the pyramid to ensure funding without giving up control.<sup>28</sup>

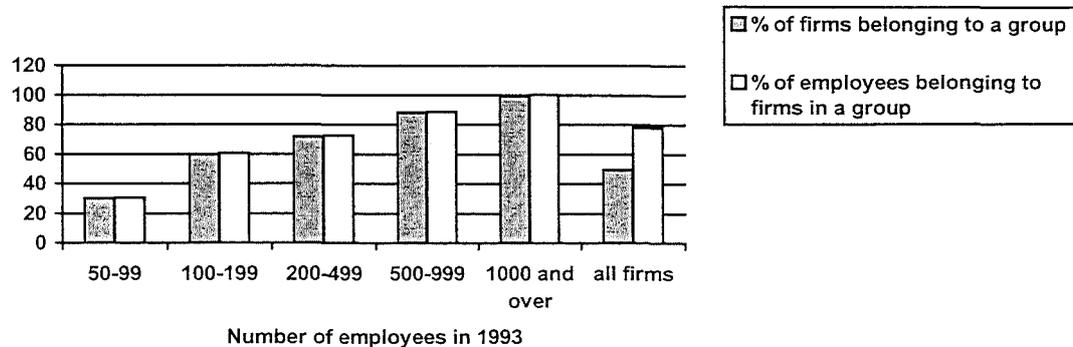
<sup>25</sup> For the same goal see also interlocking directorates and monitoring bodies.

<sup>26</sup> Very few hostile takeovers took place in Italy. One of the most famous took place in 1980s when Montedison took control over the BI-Invest holding of the Bonomi group. A few years later Montedison was taken over by the Ferruzzi group. After the privatisation of public companies the possibility of hostile takeovers has increased considerably (see for example, the hostile takeover of Olivetti over Telecom Italia in 1999) but the number is still very low.

<sup>27</sup> For a comprehensive study of the market for corporate control in Italy see Barca, *et al.* (1994a,b).

<sup>28</sup> A recent survey showed that the fear of losing control was the main motivation restraining firms' owners from stock market listings. See Mariani (1993).

Figure 3.12 Diffusion of groups among manufacturing firms



Source: OECD (1995).

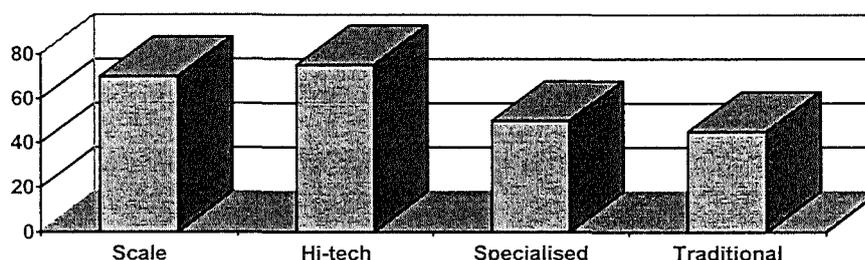
A recent study by Bianco, Casavola and Ferrando (1997), however, shows that the pyramidal group structure does not prove to be a very effective way to obtain external capital and that the level of separation between ownership and control could be even higher. The main reason for this inefficiency, Bianco, *et al.* (1997) suggest, is the existence of *agency costs*. In fact, compared to other situations where separation between ownership and control exists, a pyramidal group poses more serious agency problems. This is because the interests of the controlling agent are linked to the profitability of the share of the group they own. They diverge from those of minority shareholders of subsidiaries, who are interested in the performance of the subsidiary alone. In general, the controlling agent tries to maximise the profit of the higher level of the firm, where his stakes are larger. Frequently, this is achieved at the expenses of the subsidiaries.<sup>29</sup>

As reported by Bianchi, *et al.* (1996), there are several other benefits in the adoption of a group-form. First, this mechanism allows the exploitation of internal capital markets, the share of external funds in total resources being matched by the share of funds provided by infra-group financial transactions. The most commonly used mechanisms are internal transfers of fixed assets and shareholdings, underwriting of private placements by subsidiaries with easier access to capital markets

<sup>29</sup> The protection of the minority shareholders is one of the main concerns of the Draghi reform. See Section 3.2.5.

and subsequent reallocation to the more risky ones,<sup>30</sup> and internal loans at rates more favourable than the external ones.<sup>31</sup> The widespread diffusion of groups in the high-technology sectors (high risky) and in those characterised by scale economies (capital intensive) gives evidence of the importance played by internal capital markets.

Figure 3.13 Diffusion of groups in different sectors



Source: Bianchi, *et al.* (1997).

In the absence of a comprehensive legislation on groups, these operations reduce the level of transparency and the direct result could be that it is more difficult to raise external capital among investors, as they might not feel sufficiently protected. A proof of this has been given by Zingales (1994) who suggested that the expropriation problem must be very large in Italy as the voting premium is much higher (82%) than that in any other country. Therefore, on the one hand groups are a result of the inefficiency of Italian capital markets and on the other hand, this controlling form might have contributed to that inefficiency.

Another reason for the use of groups of firms is that, since subsidiaries are juridically autonomous, the parent company has fewer liabilities than in the case where the companies in the group are organised as divisions of one large company. In addition, groups of firms can also be used as “evasive” devices, facilitating a reduced disclosure of information to markets and government. This form could help to maintain different identities (brands), for products with different levels of quality,

<sup>30</sup> In this case, the group allocates capital to those activities that to the eyes of an insider appear profitable, but that could seem too risky to an outsider.

<sup>31</sup> Internal capital markets are studied by Buzzacchi and Colombo (1994), Buzzacchi and Colombo (1996), Buzzacchi and Pagnini (1995), Impenna and Pagnini (1993). For a study of the effect of internal capital markets on firms’ financial constraints see Schiantarelli and Sembenelli (1995).

and it could favour the obtaining of credit from banks, when the creditworthiness of each firm is higher than that of the group as a whole. Finally, it may be used in order to obtain either tax benefits or subsidies, and it may contribute to reach long-term agreements, as it increases the number of board directors for whom the controlling shareholder interacts with other relevant shareholders.<sup>32</sup>

From the point of view of this thesis, there are three aspects to be taken into consideration. First, the use of groups of firms reduces the *visibility* to the outsiders due to the lack of transparency characterising this organisational form, and this might increase the cost of obtaining external capital.<sup>33</sup> At the same time, firms belonging to groups have the advantage of using the so-called *internal capital market*. High technology firms, in particular, which usually suffer much stronger financial constraints than firms operating in more traditional sectors, could have a strong advantage in belonging to a group of firms. In fact, especially in the less diversified family businesses, the members of the family are expected to have a very high *firm-specific perceptiveness*, which allows them to transfer capital from those firms which are considered less risky by the market (and therefore do not have high capital constraints) to those that are more involved in highly innovative projects. As a matter of fact, the group form seems to be widely used within high-tech sectors. At the same time, however, the multiplication of hierarchical levels might also cause an increase in the geographical and hierarchical distance, or in other words, a reduction of internal *visibility*. As it will be shown later in this work, exploiting all the advantages in terms of innovation that the group form can offer, requires a lean organisation with a strong delegation of responsibilities and a low tendency to use financial types of control.

### 3.2.4 The market for corporate control

A peculiarity of insider systems is the very limited role played by hostile takeovers. Also in Italy, family-run businesses, high concentration of ownership, and formal and informal agreements have impeded the reallocation of control to agents not belonging to the dominant group. Small and medium-sized firms are frequently

---

<sup>32</sup> Shareholders of the various firms belonging to the group.

<sup>33</sup> Bianco, *et al.* (1996) argue that the group form is not a very efficient way to collect capital due to the diffidence of minority shareholders who might tend to prefer individual firms.

reallocated to members of the same family;<sup>34</sup> large firms are rarely threatened by hostile take-overs, and mergers and acquisitions are less frequent than in other advanced economies. In 1997, the Italian financial newspaper *Il Sole 24 Ore* noted that companies controlled by a single subject represented almost two thirds of the Milan Stock Exchange capitalisation in 1995, and the rest could not be targeted by hostile takeovers for various reasons (such as agreements or family links among various shareholders). As a matter of fact, as reported by OECD (1995), the number of mergers and acquisitions that took place in Italy over the 1990-1992 period was less than half that of France, less than one third that of Germany and around one fourth that of the United Kingdom. In the few cases in which the reallocation occurs through the market, specialised institutions do not play a very important role in circulating the necessary information and providing the necessary funds. It has been estimated that only 17% of reallocations of small and medium sized enterprises involve a specialised institution, and in only 10% of the cases are the funds used for the acquisition provided by a financial institution (80% of the reallocations are financed using the resources of the buyer). As for banks, Capra, *et al.* (1994) found that in more than 1/3 of the cases only a small percentage (6%) of the banks searches a buyer, only a few of them (5%) are in charge of evaluating the firm, only 1% is asked for fiscal and legal advice or for help in the search of new managers. Similar results are also found by Ferri and Pesaresi (1996).

Capra, *et al.* (1994) found also that a much more important role is played by business consultants (*commercialisti*) and fiscal experts. As many as 50.4% of firms involved in ownership changes use at least one service supplied by these experts, namely, the search for a buyer/seller (7.4 %), the evaluation of target firms (16.3 %), and the negotiation during the acquisition (14.8 %). Nevertheless, as the scale of the operations of these consultants is usually very limited, the likelihood of missed opportunities and market inefficiencies is high.

The limited extent of reallocation within the private sector in the last 50 years is also a result of the bankruptcy law (OECD, 1995). An efficient market for corporate control would operate in order to replace the management of the firms that

---

<sup>34</sup> According to Barca, *et al.* (1994a), at least half of the reallocations take place among members of the same family.

are continuously under-performing.<sup>35</sup> The Italian bankruptcy law, originally designed to favour creditors over the other stakeholders, has frequently been amended so as to avoid plant closures and support employment, especially through government intervention. This has obviously impeded efficient reallocation and in many cases has led the public sector to take over the under-performing companies.

In last two or three years, however, in Italy too the number of mergers and acquisitions (both local and from foreign companies) has slightly increased, especially in connection with the process of privatisation and with the consolidation of the banking sector. For example in 1999, Olivetti, the Italian computer and communications equipment producers, succeeded in its takeover of Telecom Italia, Italy's biggest phone company.

### **3.2.5 The Draghi reform and the Code of conduct**

As mentioned in one of the previous sections, the Italian capital market has historically been shallow and small. Only in the last few years, due especially to the privatisation of the numerous state owned companies, has the Italian stock exchange grown progressively and become more liquid. By the end of 1998, the market capitalisation of the stock exchange had risen to nearly 50% of GDP, and the institutionalisation of savings had become of major importance. In line with these profound developments of the capital markets, in 1998 the Government passed the Unified Finance Act known as the Draghi reform (D.Leb. 24<sup>th</sup> Feb. 1998, N. 58).

As mentioned on several occasions in the previous sections, Italian corporate governance is characterised by strong conflicts of interest between the minority shareholders and the majority shareholders. This type of agency problem, firmly linked to the lack of transparency of groups of firms, has always been held responsible for the underdevelopment of Italian capital markets and the undercapitalisation of Italian firms. Among other things, the Draghi reform was meant to improve the conditions of minority shareholders of Italian firms, so as to increase their ability to acquire capital both in Italy and abroad.

The first main part of the reform regards the composition and activity of the internal audit committee. This will be composed by a minimum of three members, at

---

<sup>35</sup> At the same time an efficient market would distinguish between a temporary crisis and a terminal one.

least one of which has to be a representative of the minority shareholders (two if the committee is composed of more than three members). In addition, as few as two members of the committee have the power to call a shareholders' meeting if they think that the senior managers are not acting in the interests of all the shareholders.

The role of the internal audit committee is now in a certain way overlapping with that of the non-executive directors and this, according to Montalenti (1997) has transformed the Italian system into something between a unitary board system and a two-tier board system.

The second section of the reform that aims at strengthening the role of the minority shareholders is the new regulation of public bids. Now, any shareholder who owns more than 30% of the total shares in a company has to offer a public bid for the total amount of shares. In this way, the minority shareholders of a target company have the same opportunity to gain an economic advantage as the majority shareholder. This modification has been strongly criticised by academics and other experts, as it could obstruct even further the achievement of an efficient functioning of the market for corporate control, making takeovers too expensive, or discouraging the listing on the stock exchange of companies that could be the target of a takeover (Montalenti 1998). Of the same opinion is Debenedetti (1998), who argues that the interests of the minority shareholders would be better safeguarded by a market for corporate control in which the public bidder would find it easier, rather than more difficult, to bid.

The third part of the reform that concerns the minority shareholders, grants to ten percent of the shareholders the right to call a shareholders' meeting.

Another point of the reform deals with the agreements among shareholders. The power of such agreements has been greatly weakened as an instrument to maintain the control over the company. The length of the agreement cannot be longer than three years at the end of which the agreement has to be renegotiated. In case of public bids, the signatories of the agreement have the right to withdraw. This latter right, which in theory should favour the occurring of takeovers, in practice will not necessarily operate in this way, as shareholders' agreements have never been only contracts but also a sort of gentlemen's agreements among members of important coalitions.

In addition to the Draghi reform and the various regulations laid down by Consob and the Bank of Italy, a Code of Conduct for listed firms was laid down

during 1999 by a group of experts on corporate governance.<sup>36</sup> Following the Code of Conduct is not compulsory for firms but, according to the members of the committee, it would “further reduce the cost of raising funds in the capital market [...] and be a means for fostering the proper control of business risk and dealing adequately with the conflicts of interest that are liable to interfere in relations between directors and shareholders and between majority and minority interests”.

The Code of Conduct resembles extensively the various Codes of Conduct that have been developed in the last seven years both in Europe and outside Europe.<sup>37</sup> It deals with such topics as the role and composition of the board of directors; the number and role of the non-executive directors; the importance of various committees (for suggestions on the appointment of directors, for the establishment of directors salaries, for internal and external control); the relationship with the shareholders and the board of auditors. In reading and comparing the various codes, however, a key characteristic of the Italian one appears to be its traditionalism and its strong Anglo-Saxon orientation. For all the comments made before about the differences between insider systems and outsider systems, one would have expected the Italian code to resemble in part the German or the Japanese one, with differences due to legislation, common practice and so on. However, even in the first few lines we find a statement that not only does not reflect the latest developments in the corporate governance debate, but also reflects an orientation that is much more outsider than that of the British one.

In the premise to the report, in fact, we find the following statement: “The Committee has identified the maximisation of shareholder value as the primary objective of good Corporate Governance, considering that in the longer term the pursuit of this goal can give rise to a virtuous circle in terms of efficiency and company integrity with beneficial effects for other stakeholders – such as customers, creditors, consumers, suppliers, employees, local communities and the environment – whose interests are already protected in the Italian legal system.” The main goal of management should be, according to this Code of Conduct, the traditional maximisation of shareholders’ value. In the long-term, the maximisation of shareholders’ value could benefit other stakeholders, such as customers, employees

---

<sup>36</sup> See <http://www.borsaitalia.it/9/122/132/570.html>.

<sup>37</sup> See for example the Hampel Code (1998) for Britain, the CalPERS Code (1998) for the United States and so on.

and so on. Their interests are in any case already protected by the legal system. The code makes no reference to the reasons why the stakeholders' interests need to be protected, letting us infer that there is some sort of underlying social responsibility. Not a single comment is made on the importance played by the stakeholders in the increase of value of the whole firm. As argued by Margaret Blair (1995), for example, the shareholders' value does not necessarily coincide with the value of the whole firm. Trying to maximise only the shareholders' value, in the long run might undermine the capability of the firm to generate profits and to be competitive in the market.

A different approach can be found in the latest British Code of Conduct, namely the Hampel report (1998). In the introduction to the report it is stated: "The single overriding objective shared by all listed companies, whatever their size or type of business, is the preservation and the greatest practicable enhancement over time of their shareholders' investment. All boards have this responsibility and their policies, structure, composition and governing processes should reflect this. A company must develop relationships relevant to its success. These will depend on the nature of the company's business; but they will include those with employees, customers, suppliers, credit providers, local communities and governments. It is management's responsibility to develop policies that address these matters; in doing so they must have regard to the overriding objective of preserving and enhancing the shareholders' investments over time. [...] This does not mean, of course that directors must run the company exclusively in the short-term interests of today's shareholders. As we explain later, the directors' duty is to shareholders both present and future. The shareholders, many of whose holdings remain largely stable over time, are interested in a company's sustained prosperity. As regards stakeholders, different types of company will have different relationships, and directors can meet their legal duties to shareholders, and can pursue the objective of long-term shareholder value successfully, only by developing and sustaining these stakeholder relationships. We believe that shareholders recognise that it is in their interests, for companies to do this and – increasingly – to have regard to the broader public acceptability of their conduct" (Hampel, 1998, p.12).

As it appears clear from this extract, the British Code recognises that the role of customers, suppliers, employees and so on, is essential in ensuring the company's success (with different degrees according to the sector) and that in most cases, taking

care of their interests is in the interests of the shareholders' too. In other words, benefits to the stakeholders should not be the results of the firms' social responsibility or a side effect of the management of the firm but an essential building block of the strategy of the firm.

It appears, therefore, that in their hurry to bring Italian listed firms and the Italian capital market up to international standards, the Committee, while diligently following the main technical aspects of the other codes, such as the importance of independent non-executive directors, or of a committee in charge of establishing the remuneration of the directors and so on, did not perceive the profound difference in the main underlying goals of the firm.

### **3.2.6 Public enterprises**

Together with industrial districts, groups of firms and independent firms, a fundamental part of the Italian economy is represented by the public sector. Before the beginning of the privatisation process,<sup>38</sup> public firms employed 1.5 million people, accounted for around 15% of non-agricultural employment, for 20% of value added and for almost 25% of fixed investments. As it is shown in Figure 3.14, before the privatisation period, the employment share of Italian public enterprises was well above the European average in all sectors with the exception of the distribution one. In particular, public firms were very widespread in the service sectors. Before the privatisation process started, at least two thirds of the banking system, three fourths of transportation and communication, and almost all of the activities related to electricity, natural gas and water, were public. In addition state-owned enterprises were also present in the industry sector in particular in electronics, food, chemicals and transport equipment.

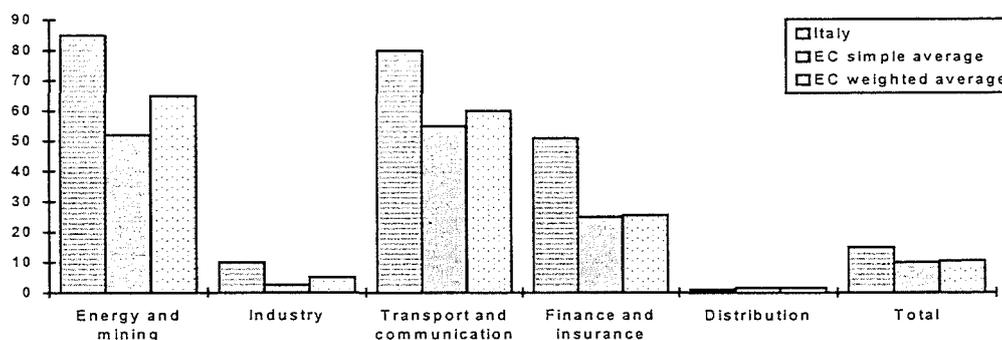
The first public conglomerate (IRI) was created in 1933 with the stakes of the three major all-purpose banks that were facing a serious financial crisis. Originally, the main aim was to allow a separation between ownership and control. In fact, it was estimated that the private sector was too undercapitalised to sustain the growth of the major firms that belonged in large part to the banking sector before the crisis. The first public entrepreneurs were typically professionals (Alberto Beneduce, Donato Menichella, Francesco Giordani etc.) and, at least in the first few years of the

---

<sup>38</sup> The privatisation process started in 1994 with the privatisation of IMI, BCI e IMA. The most recent privatisations occurred in summer 2000.

Republic a lot of effort was put in order to avoid political interference. Later on, during the 1950s, IRI started to be used as an instrument of political economy and its managers were chosen more on the basis of their political inclinations than their management skills. After that, the public sector progressively expanded, and reached its widest dimension during the 1970s. This was favoured by several factors such as the availability, until the mid-1960s, of current accounts savings, which enabled the constitution of public capital; the enduring incapability of financial markets to channel funds from households to the enterprise sector; the rigid separation between banks and firms until the early 1990s and finally the low level of integration in international capital markets.

**Figure 3.14 Employment share of public enterprises in Italy and the EC by main branches, percentage shares in 1987**



Source: OECD (1994).

Unfortunately, an exhaustive description of the activities of Italian public enterprises would require too much space, and it is beyond the scope of this thesis. In addition, the information is also not always available, given the lack of transparency characterising these firms, and, as extensively illustrated by Barca and Trento (1997), the network of relations between public and private bodies. With these qualifications, a few issues do need to be addressed.

In this thesis, when speaking about corporate governance, we refer to the system by which companies are controlled, directed and made accountable to shareholders and other stockholders. Corporate governance in public firms is necessarily different from that in private ones, as goals, incentives to managers, and forms of monitoring and control, are different. Moreover, the traditional principal-agent relationship between shareholders (taxpayers), and managers is compounded

by a more complex hierarchy of principal-agent relationships involving the interests of other subjects such as politicians and bureaucrats.

As anticipated before, starting in the 1950s, macroeconomic objectives (trade balance, inflation and employment), or the development of strategic sectors took the place of efficiency and profitability as the main goals of these firms. In addition, even if in some cases there have been positive outcomes as in the steel and energy sectors, most of the time, under goals defined as “of public interest” particular interests of political parties or single persons were concealed. For example, the strategic motive has often been used to justify incorporation or to avoid the sale of enterprises. In fact, motives were not strategic at all in many cases, such as in the case of IRI’s food and catering sub-holdings. Support to employment was one of the reasons adduced for continuing to finance the loss-making EFIM (the large public conglomerate liquidated in July 1992). However, it was estimated that providing social subsidies to the 37,000 employees of the conglomerate would have been less expensive.

Monitoring and control, both by the market and by the state, have been much more difficult and less effective than in private enterprises. In fact, on the one hand, the number of public enterprises quoted on the stock exchange was too small to allow evaluation based on the movements in the share prices. On the other hand, the intricate structure of public conglomerates, with several levels of legislative and managerial bodies in the decision-making position (often influenced by changing political parties), resulted in a low level of transparency. Moreover, public conglomerates such as IRI and EFIM did not need to provide consolidate balance sheets until the mid-1970s, impeding in this way other forms of control, such as frequently revised current-cost valuations.

Further, the structure of incentives has been different from that in private companies. In fact, not only were public companies shielded from the threat of hostile take-overs and bankruptcies, but they also had less stringent budget constraints. This obviously reduced the incentive for profit seeking behaviour. As a matter of fact, the endowment funds given at the beginning were periodically increased, and the state received no interest or dividend payment in return.

Notwithstanding the notorious productive inefficiencies of public enterprises, they seem to have played quite an important role in the process of technological innovation in Italy. This is probably due to several factors: their privileged contacts

with public financial sources; a capacity to tolerate long handling times of application; and better-than-average possibilities of in-house financing. In particular, according to the data on R&D expenditure, in the last 15 years, state controlled enterprises made a significant contribution to the total spending, amounting on average to 20%.

The general strategy of these firms has been to raise the technological level of domestic producers in those sectors where they were already heavily involved, namely information systems and telecommunications, chemicals, energy, aerospace, new means of transport, new materials and biotechnology. At the same time, however, it is difficult to judge whether expenditures in R&D and other forms of investment for innovations were made on the basis of accurate economic evaluation, or just on the basis of political interests. In fact, it is more probable that funds were allocated not to those sectors or firms that were proving to have important and useful innovative projects but to those sectors or particular firms that were part of a large and political project. It is also fairly difficult to believe that the managers of public firms had the necessary technical skills to understand the processes of innovation taking place in their firms. Furthermore, the lack of transparency certainly contributed to reducing the degree of *visibility* to levels much lower than those normally characterising such industries.

The process of privatisation has profoundly reduced state involvement in Italian industry. The year 1999, with the privatisation of Enel, the electricity company and of Società Autostrade, the company that runs the highways, represented probably one of the most significant steps in the whole process. It is still too early to evaluate the effect on the efficiency of firms of private property. However, as mentioned several times, this process has already produced a profound effect on the size and liquidity of capital markets and on the activity of the market for corporate control (see case Olivetti-Telecom).

### **3.2.7 The role of the public sector in innovation**<sup>39</sup>

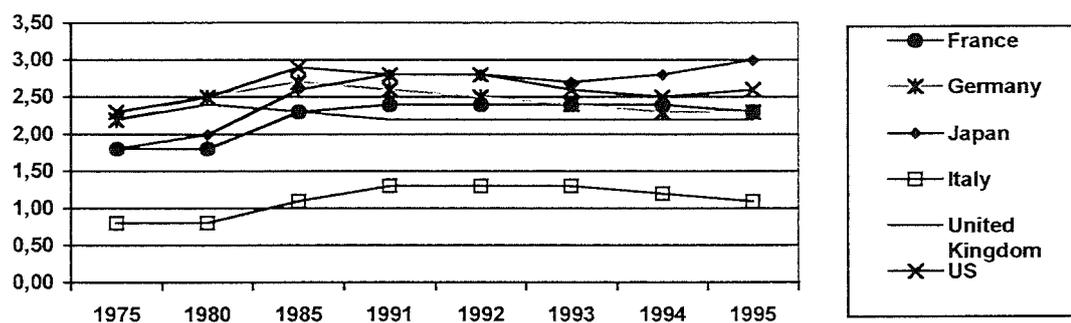
Italy does not have a long tradition in terms of public intervention for innovation. In fact, as Italy was a late industrialiser, until the second half of the

---

<sup>39</sup> This section draws in large part from OECD (1992).

twentieth century neither private firms nor the state spent considerable sums of money on R&D. Even if during the 1970s and especially 1980s a lot of effort was put to reduce the gap between Italy and the other advanced countries, as Figure 3.15 illustrates, the difference was still considerable. In 1995 the R&D expenditures were just above 1% of GDP. All the other advanced economies spent at least twice that amount. In the same year, Japan spent as much as 3% of GDP in R&D activities.

**Figure 3.15 R&D expenditure as a percentage of GDP**



Source: Murst (1997).

The first public policies in favour of innovation were introduced during the 1950s and 1960s. However, they were fragmented and incoherent, with an irrational division of resources. Moreover, the little funds provided for innovation activities were mainly for basic research with hardly any funds devoted to applied research. The lack of funding to finance complementary activities such as applied research, design and marketing led many firms to quit highly innovative activities started during the 1950s and 1960s (examples include the production of computers by Olivetti, the studies on nuclear power by Cnen and on the laser technology by Cise and the Polytechnic of Milan.) Their efforts were directed to less cutting edge technologies. Only in the second half of 1960s (law 1089/1968 on applied research; Sabatini law 1965 (n.1329, 28/11/65), for the diffusion of machine tools) and during the 1970s (Dpr 902/1976; law 675/1977 on applied research; law 696/ 1983 on the purchase of new capital assets) did the State seem to realise the importance of complementary activities in the process of innovation. Fundamental was the role played by the Applied Research Fund, which is still in use and it is administered by Murst (Ministry for Universities and Scientific and Technological Research). This instrument provides funds in the form of outright grants, low interest loans and in

some cases risk capital for applied research projects carried out by industrial companies, consortia of such companies, public bodies engaging in productive activities and other industrial research companies. The application for funding has to be sent to IMI and the evaluation is carried out by a committee of specialists (mainly university professors) who are replaced every three years. In the first decades the fund sustained especially the oligopolistic core, namely Fiat, Olivetti and IRI but in the last few years, especially since the introduction of a simplified application procedure for SMEs, it has been used by a larger number of firms in several sectors of the economy.

Act 1089/1968 was modified by Act 46/1982, which established the Technological Innovation Fund. The latter is administered by MITI (Minister of Industry) and it is designed to finance projects for the introduction of new products or processes or the improvement of existing ones. The fund is aimed at financing all those activities, such as design, experimentation, development and pre-production, which are necessary for the implementation of applied research projects. It provides low-interest loans and subsidies and permits the funding of programs already begun. Although these schemes favoured mainly large firms (90 per cent for the Applied Research Fund and 80 per cent for Technological Innovation Fund in 1987), they were also designed to finance projects carried out by SMEs (for example through easier processes of assessment).

These two funds have played a very important role in increasing the technological and research capabilities of Italian firms over the past 20 years. At the same time, as argued by Malerba (1993) there remain several major problems. First, the two funds are not very well co-ordinated and for this reason not very effective. Second, they are not used to stimulate new projects, but only as a support for already existing ones. Third, the vast majority of projects is characterised by a medium level of innovativeness, and is not at the technological frontier. Fourth, new high technology firms are not favoured at all. Fifth, funds are provided in the form of direct financial support to firms' activities instead of offering a broader range of policy tools. Finally, too many sectors are supported and the bureaucratic procedures which firms must handle in order to obtain the funds are still too long.

To conclude, the *industry-specific expertise* of public agencies in charge of providing public forms of financing for innovation is rather high. Nonetheless, up until now, due to the length and complexity of bureaucratic procedures, public funds

do not seem to have played a determining role within the set of funding sources for innovation. This deficiency is especially evident among established medium and small firms and also in new high technology start-ups.

### 3.3 *Inclusion of the stakeholders*

The degree of appropriation of the returns to an innovation depends, among other things, on the role played by other stakeholders in the innovation process itself. In numerous sectors, where the degree of *appropriability* is rather low, suppliers, customers and employees play an essential role in the innovation process. In particular they might be required to make specific investments (in machinery or research or in the accumulation of expertise), which cannot be used in other ways. This strongly enhances the degree of innovativeness of the firm. In situations like these, the best strategy is to build up some sort of coalition with those stakeholders. These coalitions do not need to take the form of a joint venture or of an exchange of shareholding. In many cases, they can be based on trust or on informal agreements. For example, the innovative firm may agree to pay a higher price to the supplier, may finance part of its R&D expenditure, or may offer support in other ways.

As for the employees, the coalition might take an obviously institutionalised form, as in Germany for example, or else a more subtle form. In this latter case, there could be an informal promise of a lifetime employment (see Japan)<sup>40</sup> or, in small firms, a strong relationship of trust with the entrepreneur, or finally the legislation for the protection of employees might pose serious obstacles in laying off workers.

All these forms of coalition play an essential role in obtaining the collaboration of the various stakeholders (firm-specific investments by the suppliers, or accumulation of firm-specific skills by the employees and an active role in the innovation process, etc), collaboration that a pure *shareholders first strategy* would not achieve. This, however, does not mean that coalitions are always necessary. In fact, there are several highly innovative sectors where long-term relationships would obstruct change, and impede the achievement of the most effective process of change.

---

<sup>40</sup> Cfr. Blair (1999).

### 3.3.1 Customers and suppliers

One of the main characteristics of Italian industry is the importance of close long-term relationship of firms with suppliers and customers. These relationships spread in every direction, horizontally and vertically. In fact, on the one hand there are numerous groups of firms, which we mentioned before. Moreover, there are the famous industrial districts.<sup>41</sup> As extensively explained by Brusco (1982), within those areas, several hundred firms specialise in one or two stages of the process of industrialisation of a particular product (chairs, glasses, tiles, gold jewellery and so on), which are then assembled and marked by only a few them. The division of labour among so many firms gives rise to a strong network of close long-term relationships. This is also enforced by a common culture, a similar level of capability and the capacity to transmit and assimilate tacit and non-codified knowledge. The presence of strong interconnections, however, does not mean that firms are adopting a collusive strategy. On the contrary, one of the driving forces of innovation within districts is definitely the high degree of competition among these firms. Regional and local governments, banks and professional schools that provide public support, financial resources and qualified labour force to firms, favour the good functioning of districts. Moreover, export and distribution associations contribute to the process of internationalisation of small firms, helping them to sell their final products abroad.

A good example of the functioning of a district is that offered by the Chair District of Manzano. There, a number of firms and the local bank have recently set up their own inter-district IT network. Through radio devices, most of the firms of the district and the bank are now connected. Information concerning stocks, billing, drawings and so on are spread in real time across the district and to the bank. This means that orders no longer need, as the program, which also provides for the billing, sends them automatically. On the other hand, the bank is immediately and automatically informed of the operation and promptly makes the payment.

---

<sup>41</sup> Districts are more widespread in the Northeast, in Lombardia, in some part of Piemonte and in the Centre, especially on the Adriatic coast. In the Mezzogiorno there are hardly any district with the exception of Puglia, Campania and Sardinia. Some of them have been in existence for decades, such as the textile districts in northern Italy. Others grew up more recently as Sassuolo, Prato and Valdarno Inferiore. In 1991 they employed 34% of total employment among firms with less than 200 employees.

In addition to districts, there is in Italy a small number of very large firms that are surrounded by hundreds of subcontractors. These subcontractors are totally dominated (and often exploited) by the large firms, but usually cannot survive without this type of relationship. The subcontractors are not usually very innovative and strictly follow the guidelines coming from the large firm. The relationship is often close, long-term and exclusive.

Both the districts and the larger firms are sustained by a second, less visible layer of activity. It consists of all those firms that make the machines that are utilised in the production process. These equipment suppliers usually have a close long-term relationship with the firms. They know their needs, and work together with them for the introduction of new high technology machinery. Thanks to their high capability to absorb new electronics technologies in their products and their advanced technical and design skills, these firms generate a continuous stream of incremental innovations in equipment, and contribute to the flexibility of the users of their machines. The importance of the close long-term relationships of machine suppliers and producers is attested by their geographical localisation. For example, near Valenza Po there is both a cluster of gold jewellery producers and of gold forging machines builders. The same is true for spectacles in Veneto and for tiles in the Modena area. As reported by the Economist (1998c): "Northern Italy's long-standing clusters are proof of the value of collaboration. Elena Ferraro of IECO, which makes machines for melting and electroforming gold, underlines the importance of exchanging information with her customers. Of the firm's sales, 60% are within Italy. Most of those are of customised machines, rather than the off-the-shelf models and complete turnkey factories that IECO sells abroad. The need to keep up with the demands of the more sophisticated Italian goldsmiths has enabled Italian suppliers such as IECO, and nearby Sisma, to dominate their business, supplying about 80% of the total world market for machinery for making gold jewellery". There is therefore, a mutual exchange of information that generates those that Malerba (1993) called the innovative spirals where high requirements of firms, draw out the innovativeness of machine builders, whose inventions allow firms to be even more innovative.

This type of relationship, however, seems to be fading away, due the globalisation of the markets. In fact, in an article that appeared just a couple of years ago on the Economist (1998c), it was reported that there is great fear among Italian industrialists that globalisation will weaken the country's clusters. "Rather than use

machines that might be sold to their competitors, some bigger firms prefer to rely on equipment from in-house workshops". Barilla, Safilo and many other firms are developing in-house machines shaped to their own needs because, they claim, machine producers are now selling machines everywhere in the world, including to their direct competitors in Asia, for example.

### 3.3.2 Labour market

Together with the importance of close long-term inter-firm relationships with customers and suppliers, another issue that needs to be addressed is the type of relation with employees and their level of *inclusion*.

The structure of the labour market in Italy is very similar to those in Germany and Japan (See Table 3.12). The average duration of employment is very high, 14 years which is twice as long as in the US, for example. The reason is to be found first in the employment legislation (Art. 2119 c.c. and Art. 1 law 604/66 allow employers to dismiss an employee respectively only for *giusta causa*<sup>42</sup> or *giustificato motivo*<sup>43</sup>). Second, it arises from the widespread diffusion of family-run businesses, which are characterised by the loyalty of the employees and by trust relationships.

Table 3.12 Human resources management. On average the data refer to the year 1994.

	Italy	United States	Japan	Germany	France	United Kingdom
Average duration of employment (years)	14.0	6.7	10.9	10.4	10.1	7.9
Wage profile (production workers) <sup>1</sup>	1.09	0.95	1.26	0.95	-	-
Wage profile (office workers) <sup>1</sup>	1.42	1.03	1.5	1.00	-	-
Earnings dispersion <sup>2</sup>	1.56 <sup>3</sup>	2.14 <sup>4</sup>	1.73	-	-	1.99 <sup>5</sup>
Ratio of CEO compensation over manufacturing workers' compensation	14.20	25.02	13.01	9.95	16.94	16.43

1 Ratio of wage for employees aged 50-54 years to wage of employees aged 30-34.

2 Ratio of ninth over fifth decile.

3 1987.

4 1989.

5 1991.

Source: OECD (1995).

<sup>42</sup> The notion of *giusta causa* refers to a default of the employee and more in general to each episode that diminishes the degree of trust existing between the employer and the employee (See L. 15/7 1966, n.604).

<sup>43</sup> *Giustificato motivo* refers to reasons concerning the correct functioning of the firm and the organisation of labour (See art. 3, L.604/1966).

Employment turnover is higher in smaller firms than in larger ones. Considering only manufacturing firms, the rate of turnover per year is 49.10<sup>44</sup> in those with less than 20 employees, 28.60 in those with 20 to 199 employees, 19.10 in those with 200 to 1000 employees and 13.10 in those with more than a 1000 employees. This phenomenon was even more evident before May 1990 when legislation against unfair dismissals did not apply to firms with less than 15 employees. These firms were therefore able to hire and fire as the volume of orders changed.<sup>45</sup>

By contrast, in large firms, laying off workers is almost impossible. The strength of the unions ensures that labour legislation is strongly respected. Shop-floor representatives are recognised, and this guarantees an average wage higher than in small firms. Employees' representatives do not have the right to sit in the managing boards, but the power of the unions guarantees that once an agreement is reached with the employer, its terms will be enforced without subsequent localised conflict among the workers.<sup>46</sup> This is important especially because it allows the entrepreneur to plan with more precision the volume of production and investment.

The rate of turnover changes also in accordance with the sector in consideration. Turnover is higher in traditional sectors and in sectors characterised by a low level of technology, and it is usually lower in highly innovative sectors.<sup>47</sup> It is also seen that the rate of turnover is higher for younger employees, for blue collars than for white-collar workers, for women than for men, in the Mezzogiorno and in the Northeast than in the other regions.<sup>48</sup>

A low level of turnover prevents a large outflow of resources from one firm to the other and it is therefore important in the process of technological innovation and appropriation, especially in those sectors characterised by an incremental type of innovation. At the same time, though, it could also cause a strong tendency of conservatism, impeding liberal structural changes often necessary in the adoption of new technologies. In fact, according to the recent survey on technological

---

<sup>44</sup> Calculated as the number of employees leaving the firm, divided by the total number of employees and multiplied by 100.

<sup>45</sup> However, the high rate of turnover in small firms is more due to the fact that workers usually aim for better jobs in larger firms than to a decision of the entrepreneurs. The latter group in fact, due to the position usually played in the community feels the obligation to maintain and as far as possible increase and improve employment.

<sup>46</sup> See Brusco (1982).

<sup>47</sup> High innovative firms seem to use more incentives to keep their employees.

<sup>48</sup> See Pacelli and Rapiti (1995).

innovation,<sup>49</sup> Italian industrialists rank among the major obstacles to innovation the inability of their firms to adapt to the needed changes.

In Italy, dispersion of wages is very low and the wage profile, both for manual workers and for office workers is based on seniority<sup>50</sup> (see Table 3.12). In particular, as hostile take-overs are very unlikely, the ratio of executive compensation to production wages is only 14.20, which is much lower than the US (25) (see Table 3.12). For the same reason, the use of stock options and other forms of long-term incentives (very common in market-based systems) is not needed and therefore not very common. Offers of equity shares to employees have always had a financial connotation and were never aimed at encouraging employees' participation in the corporate governance of Italian firms. In general, the level of participation is higher in the North West, among managers, within the financial sector and in firms with 41-50 employees.<sup>51</sup>

Even though on average large high-technology firms tend to have the lowest level of turnover, there is a phenomenon that deserves to be mentioned. There are a few small and medium sized high-tech enterprises in the electronics, software, and service sectors, which have been set up by technicians and engineers who left their previous occupation in a large company to meet some customer demand. These firms usually do not have their own research laboratory and incorporate (often successfully) already existing components and software in new systems or products especially designed to satisfy the client's needs.

To conclude, even if the Italian employees do not have the same power of co-determination as the German ones, their degree of *inclusion* appears to be quite high. In fact, as much as in Germany, the entrepreneur has a feeling of social responsibility towards the community in which the firm is set and where he/she usually lives<sup>52</sup> and in his/her decisions the interests of the employees are considered as an important variable. Moreover this attitude is strengthened by the feeling of trust that grows between the employer and the employees due to the low level of employment turnover within firms.

---

<sup>49</sup> See Iammarino, Prisco and Silvani (1996).

<sup>50</sup> In small firms, there is a much higher dispersion of wages, going from the maintenance workers who can earn twice as much as their factory fellows, to the immigrant home workers who get less than one-third of what they would receive in the factory.

<sup>51</sup> See [http://www.cfi.it/\\_forum/00000017.htm](http://www.cfi.it/_forum/00000017.htm)

### 3.4 Matching corporate governance and industrial specialisation

In the previous sections the main characteristics of the Italian corporate governance system have been explored. In this section we will try to draw some conclusions about the degree of *firm-specific perceptiveness*, *industry-specific expertise* and *inclusion* of the stakeholders. Moreover, we will compare the effective specialisation of the Italian industry with that expected on the basis of the characteristics of the corporate governance and of the theoretical framework.

In Italy there is a very high *firm-specific perceptiveness* among shareholders of both small and large firms. Family control is one of the most widespread forms of control and the owners and their families usually operate actively within the firm. Codified and tacit knowledge is transferred from one generation to the other in a process which starts very early in the life of the family members. Short-term pressures coming from the shareholders are therefore very unlikely and in general do not prevent firms from investing in innovative projects. Moreover, as in practical terms there are no threats of take-overs, short-term pressures are also not performed by the market for corporate control. Even when control is indirect and exercised through the chain of equity shares (i.e. groups of firms), at the end of the chain there is usually a family (for example Agnelli family) exercising influence. In this case, the *firm-specific perceptiveness* allows firms to overcome the inefficiencies of the capital market. Thus, the capital acquired by one firm could be re-directed to another firm within the same group to ameliorate problems of liquidity. Banks and other financial institutions have never played a central role in the corporate governance of Italian firms. The only exceptions have been Mediobanca, banks within districts, and banks related to large firms through interlocking directorates.

A peculiarity of the Italian system is the role played by the state. As explained in Section 3.2.6, before the beginning of the privatisation process public firms were present in several industrial and service sectors, accounting for 20 per cent of the value added. Nevertheless, as public managers were usually appointed for political reasons and very often they were politicians rather than managers, it can be argued that, much as in France, they have “no more capacity than outsider investors to monitor and evaluate innovation carried out in a multitude of smallish firms or subdivisions of large firms” (Tylecote and Conesa, 1999, p.34). Moreover, in many

---

<sup>52</sup> See Danieli case study, Chapter 6.

cases, investments were not made on the basis of the expected future profits, but were inspired by other aims such as macroeconomic objectives or the development of strategic sectors.

The most widely adopted strategy in Italy is certainly the *inclusion* of stakeholders one, both with regards to the employees and the customers/suppliers. In fact, even though representatives of Italian employees do not have the right of codetermination as they do in Germany and they cannot sit in the management boards, it appears that the interests of the employees are taken into consideration in the decision making processes. This is for several reasons. Firstly, for legal reasons firms are allowed to fire employees only for *giusta causa* or *giustificato motivo*, which are two reasons that are very difficult to sustain. In addition, as the employee-employer relationship is usually based on loyalty and trust, especially in small and medium sized firms, employers hardly ever make use of their limited right to fire employees. Moreover, as in Germany, entrepreneurs usually have a feeling of social responsibility towards the community they live in and they do not usually consider the price of the equity shares as more important than the employment level. Furthermore, especially among large firms, workers organisations are very powerful and operate to make sure that the interests of the employees are respected.

Suppliers and customers play a very important role in the process of innovation of Italian firms and close long-term inter-firm relationships are very common. Especially among groups of firms, and within districts, co-operation is essential and in many cases innovative projects are carried out by two or more firms along the value chain. Moreover, as indicated by the Community Innovation Survey, in many of the traditional sectors, the purchase of high technology machinery represents the largest part of the costs for innovation. As explained in Section 3.3.1, equipment producers usually know the needs of the users and work together with them for the introduction of new high technology machinery.

As much as for the German system, the *inclusion* of the employees in Italy has the direct effect of encouraging a high level of conservatism, and this makes this system weak when innovation requires radical change. As a matter of fact, resistance to change within the firm was one of the obstacles to innovation, after financial reasons, indicated by Italian managers in the 1990-1992 Community Innovation Survey. At the same time new start up firms in the high technology sectors seem to encounter serious difficulties in finding capital as the venture capital market is still

young, and tends to finance more traditional sectors. In addition, banks and other financial institutions in general lack any sort of *industry-specific expertise* as, for legal reasons (they could not acquire equity shares in non-financial firms) they have never found it convenient to invest in this kind of knowledge. Only within industrial districts does the situation appear to be different, as the presence of interlocking directorates between banks and firms should mean that a certain level of *industry-specific expertise* is/has been available. The state seems to have a certain degree of *industry-specific expertise* as the public agencies in charge of evaluating innovative projects for financing are composed of professionals and experts of the various sectors. However, as mentioned in Section 3.2.7, until now, public schemes have mainly been used by large firms, for already existing projects and only in a small percentage by small new-start up firms. This suggests that the public sector's *industry-specific expertise* has not been used to cope with *novelty*.

Given the above considerations, the Italian system of corporate governance is expected to be specialised in sectors characterised by a low level of *visibility*, a low level of *appropriability* and a low level of *novelty*. According to Tylecote and Conesa (1999, p.45)<sup>53</sup> the mechanical and electrical engineering sectors seem to be the ones that match, more than others, these requirements. In fact in such sectors “generally the process of innovation is decentralised, with innovations very dependent on low visibility activities”, the innovations are “too difficult to protect by patent” and there is a tendency towards close long-term inter firm relationships. Moreover, their objected-oriented character and low level of growth “favour systems with a high *inclusion* of stakeholders.” On the other hand, the electronic capital and intermediate goods sectors present a high level of *novelty*, which is at odds with the low level of *industry-specific expertise* and the high level of *inclusion* of stakeholders characterising the Italian system. As for the chemistry-based group, it is indispensable to make further distinctions, as it comprehends rather different sectors. In fact, although all of the sectors present a high level of *visibility* (which makes the Italian *firm-specific perceptiveness* redundant),<sup>54</sup> only the pharmaceutical one is so high-tech as to have high *novelty* (Cfr. Frequent and radical breaks with the past). At

---

<sup>53</sup> For a description of the characteristics of the various sectors in terms of *visibility*, *appropriability* and *novelty*, see Chapter 1, Sections 1.5.1, 1.5.2 and 1.5.3.

<sup>54</sup> See Tylecote and Conesa (1999) for the same considerations about Germany.

the same time, even though most of the sectors are function-oriented<sup>55</sup> and therefore do not require a cumulative learning on the shop floor, the “volumes” one (bulk steel, glass production, standard petrochemicals, etc.)<sup>56</sup> because of the inclusion of metals and glass, does. Finally, the use of close long-term inter-firm relationships are by far more important for chemical effects (paints, adhesives, etc) than for volumes and consumer goods (shampoo, etc) and pharmaceuticals. Italy is therefore expected to be much more specialised in volumes, due to the low *visibility*, the importance of the cumulative learning on the shop floor, the medium importance of close long-term inter-firm relationships and low level of *novelty*. At the same time, it is expected to perform quite well in chemical effects due to the importance of close long-term inter-firm relationships, worse in consumer goods and quite poorly in pharmaceuticals.

### 3.5 The Italian sectoral specialisation

Even if in the last two decades a lot of effort has been spent to reduce the technological gap between Italy and the other advanced countries there is still a lot that needs to be done. In fact, OECD (1996) reports that in 1995 Italy was the sixth country among the OECD in terms of total volume of R&D expenditure. At the same time, the intensity of R&D measured as a percentage of GDP and the share of R&D expenditures carried out by private enterprises were much lower than the average of the OECD countries.

**Table 3.13 Share of high technology products on total exports**

	1980-82	1989-91	1993-95
Italy	11.4	14.7	14.7
France	15.5	25.0	27.6
Germany	17.9	21.6	22.5
United Kingdom	23.8	33.0	36.8
Spain	8.8	13.9	14.6
EU (15)	16.9	22.4	24.3
United States	31.5	41.4	40.7
Japan	21.1	31.9	32.5
Total	19.5	25.9	28.3

Source: Trenti (1999).

In terms of sectoral specialisation, a preliminary insight is offered by the data that relate the share of high technology products to the total level of exports. As it can be seen in Table 3.13, this percentage is by far lower in Italy than in the other G7

<sup>55</sup> Cfr. Itami (1994). See also Chapter 1, Section 1.5.2.

<sup>56</sup> See Chapter 1.

countries and, contrary to them, the level has remained unchanged during the 1989-1995 period. As suggested by Trenti (1999) this means that Italy has undergone a progressive process of specialisation in the traditional sectors, with a substantial reduction of the efforts put in during the 1980s to reduce the technological gap. Moreover, Trenti (1999) also reports that in the case of Italy, unlike Germany and France, there has been a strong reduction of the importance in terms of value added and employment in sectors characterised by a medium-high level of technology, namely chemicals, electrical machinery, instrumental mechanics, means of transport. Further such reduction has not been accompanied by a similar increase in the sectors at the technological frontier such as telecommunications, pharmaceuticals and informatics as it happened in the other advanced countries. Bearing this in mind (namely that Italy is more specialised in traditional sectors than in high technology ones), we will now direct our attention to the high technology sectors.

**Table 3.14 Technological and trade specialisation, 1987-91**

	Technological specialisation 87-91	Trade specialisation 87-91
Mechanical and electric capital	136	145
Mechanical and electric intermediate	81	166
Mechanical and electrical consumer	214	247
Auto vehicles	106	74
Electronics capital intermediate goods	62	52
Chemistry-based volumes	85	107
Chemical effects	154	74
Chemical consumer	65	78
Drugs and biotechnology	196	70
All industries	100	100

Source: Guerrieri and Tylecote (1998).

In general studies on industrial specialisation use either trade categories (e.g. exports) or technology categories (e.g. patents),<sup>57</sup> or more often a combination of the two.<sup>58</sup> We will borrow the indicators calculated by Guerrieri and Tylecote (1998), which consist of one indicator for trade and one for technological specialisation. For trade, the indicator they use is the Trade specialisation, which is the ratio of a

<sup>57</sup> See Archibugi and Pianta (1992) for a comparative analysis based on patent data.

<sup>58</sup> See ENEA-Cespri-Politecnico di Milano (1998).

country's share of world exports in product group  $i$  to the share of the same country in total world exports (the Balassa index for trade specialisation). For technological specialisation, the indicator is the Technological specialisation, which is the ratio of a country's share of patents registered in the USA in product group  $i$  to the share of the same country in total US patents. As it can be seen in Table 3.14, the indicators refer to the 1987-1991 period and comprehend three main groups of sectors namely the engineering, the chemicals and the electronics ones.

As expected, Italy presents a high level of both technological and trade specialisation in the mechanical and electrical engineering sectors. In fact, all the sectors score far more than 100 in the trade specialisation category. Two out of three score more than 100 also in the technological specialisation category. The importance and high innovativeness of this sector for the Italian industry is confirmed by the results of the CIS survey. In fact, on the one hand it appears that the mechanical sector presents the highest percentage of innovative firms within the Italian industry even though the chemicals sector spends more on R&D. On the other hand, Italian firms ranked "embodied technical change in terms of investments in new machinery" as the major source of innovation. This is because, as explained at length by Malerba (1993), both firms within the districts and firms in the traditional sectors are highly reliant for their innovations on new and innovative equipment (and machinery in particular), produced ad hoc for their needs, generally in collaboration with the suppliers. This in turn, has started "virtuous vertical innovative cycles" where the equipment producers became more and more innovative as "technologically progressive and highly competitive users requested new advanced capital equipment to upstream producers that were therefore stimulated to satisfy users' demand with innovative equipment" (Malerba, 1993, p.255). A clear example of this symbiosis relationship is offered by the textile equipment firms in the textile district of Biella in Piemonte.

As expected, the level of specialisation in the chemicals sectors is on average lower than that in the mechanical ones. Among the chemicals sectors we were expecting quite a high specialisation in volumes (bulk steel, glass production, standard petrochemicals, etc), lower in chemical effects (paints, adhesives, etc) and in consumer goods (shampoo, etc) and a very limited specialisation in drugs and biotechnology. The results in terms of trade specialisation appear to totally fulfil these expectations. In fact, chemical volumes presents a value higher than 100 (107)

whereas chemical consumer goods (78), chemical effects (74) and drugs and biotechnology (70) have much lower values.<sup>59</sup> As expected the electronics sector scores lower than any other sector.

As for the technological innovation index, the results are on average satisfactory with the exception of the high score in drugs and biotechnology and in chemical effects. These sectors score well above 100. This is surprising but not difficult to explain. In fact, as suggested by Malerba (1991), the index of technological specialisation based on patents counts the number of patents and not their importance. Italian firms in the drugs and biotechnology and chemical effects sectors might be patenting marginal and incremental innovations. And this is confirmed also by the low score in the trade specialisation.

## Conclusion

In this chapter we have analysed the Italian system of corporate governance. We have shown that the principal variables indicated by Berglöf (1997) as being particular of the insider group can be found in the Italian system. In fact, Italian firms depend heavily on bank finance (even though very few banks have ever played an important role in the corporate governance of firms) (See 3.2.3.1); financial markets have historically been shallow and small (albeit they have grown and become more liquid) (See 3.2.3.2); ownership and control are concentrated (the role of the state is important) (See 3.2.2); groups of firms are very widespread and used as a mechanism to separate ownership and control which cause conflicts of interest between minority and majority shareholders (See 3.2.3.5); boards of directors play a limited role (See 3.2.1); the market for corporate control is not active, and hostile take-overs are difficult and unlikely (See 3.2.4).

In terms of the theoretical framework, the Italian system of corporate governance appears to be characterised on average by a high *firm-specific perceptiveness*, a high *inclusion* of the stakeholders and a low *industry-specific expertise*. This, as shown in Section 3.5, helps to explain the Italian industrial specialisation in sectors characterised by low *visibility*, low *appropriability* and low *novelty* such as the mechanical engineering sectors. It also offers an explanation for

---

<sup>59</sup> We were however expecting a higher value for chemical effects than consumer goods.

the low specialisation in sectors characterised by radical innovations such as with electronics, drugs and biotechnologies.

In this chapter, however, it has also been shown that Italy, along with the other insider systems<sup>60</sup> has slowly begun to move towards the outsider position. The process of privatisation has been reducing the role of the state and will continue to result in increasing the number of listed firms as well as increasing the stock market capitalisation. This can be seen as the Italian stock market has developed to a much higher level of liquidity and transparency than has historically been the case. The role of financial institutions is increasing and firms are experiencing new forms of financing in addition to bank loans. The private equity and venture capital markets underwent a spectacular development. Many groups have undergone processes of restructuring, reducing the number of levels and therefore increasing transparency. In addition, the new Draghi reform on financial markets has introduced new mechanisms for the protection of minority shareholders, therefore reducing conflicts of interest between them and the majority shareholders. Globalisation is reducing the strength of close long-term inter-firm relationships. Firms tend to make a progressively larger use of unskilled employees coming from the underdeveloped countries, who are hired with short-term contracts and not *included*.

“However innovation systems are not naturally given” (Metcalf, 2000, p.7). They are not static entities and evolve as a result of the activity and interaction of individuals. They can improve but they can also become less effective in delivering innovations. The latest developments in Italian corporate governance have been unanimously welcomed as a sign of the progressive evolution of Italy. However, the same developments, if not appropriately dealt with, could even reduce the degree of innovativeness of Italian firms. In fact, if with the shift towards the outsider end of the continuum, the presence of insider shareholders is reduced and banks and other financial institutions do not assume a long-term perspective; and if the role played by the important stakeholders is neglected and firms adopt a strategy for the maximisation of the shareholders’ value (as suggested by the Code of conduct), the strengths of Italy in sectors characterised by low *visibility*, low *appropriability* and low *novelty* could vanish. On the other hand, Italy’s strengths in sectors characterised by high *visibility*, high *appropriability* and high *novelty* are still rather

---

<sup>60</sup> For example Germany and Sweden.

underdeveloped in comparison with the outsider countries. In fact, the Italian private equity and venture capital markets are developing but are still very small in comparison with the American and the British ones. Furthermore, legislation on job protection would prevent firms from pursuing the latest developments in the market, dismantling subsidiaries and laying off large sections of the work force if needed. Borrowing Porter's (1985) expression, Italy would find itself "stuck in the middle",<sup>61</sup> which would be deleterious for the whole economy.

---

<sup>61</sup> "A firm that engages in each generic strategy but fails to achieve any of them is 'stuck in the middle'. It possesses no competitive advantage. This strategic position is usually a recipe for below-average performance" (Porter, 1985, p.16).

## 4. The machine-tool sector

### 4.1 Introduction

In the previous chapters we have introduced the theoretical framework and given an overview of the Italian system of corporate governance. In this chapter and in the following the focus will mainly be on the machine-tool sector.

In Section 4.2, we will give a general overview of the sector. We will define machine-tools and present the structure of industry and its current trends. In Section 4.3, we will present the historical background of the sector, focusing mainly on the decline of importance of the US and the upsurge of Japan. Then, in Section 4.4, we will proceed with the analysis of the sector in terms of *novelty*, *appropriability*, and *visibility*, paying a particular attention to the role played by the introduction of NCs (numeric controls) and CNCs (computerised numeric controls). Finally, Section 4.5 contains an attempted explanation, on the basis of Tylecote's framework, of the upsurge of Japan to a leadership position in the machine-tool sector and the decline of the US during the 1970s and 1980s.

### 4.2 General characteristics of the sector

As reported by Sciberras and Payne (1985, p.19), "there are two kinds of machine-tools used in metal working. The first shapes metal by cutting it to the correct shape and correct size. [...] The second kind of machine-tool shapes the metal in one of two ways, either by shearing, or by hammering or squeezing the metal into shape. Such machines are known as metal-forming tools." The Standard Industrial Classification (SIC), codes 3541, 3542, 3545 and 3549, includes also the associated accessories, but metal-cutting and metal-forming machines represent the core of the sector. Sciberras and Payne (1985) offer also a four-dimensional classification of machine-tools. They distinguish between general purpose and special purpose tools according to the level of flexibility. They also distinguish between standard and custom engineered according to the degree of standardisation of the constituting components. Further distinctions are made between systems and stand-alone machine-tools; and finally between conventionally and numerically controlled (NC/CNC).

The machine-tool sector is one of the smallest in the manufacturing sectors. In Japan in 1989, metal cutting<sup>1</sup> machine-tools represented only 1.7% of the production value of total machinery and equipment (Wieandt, 1994) and in 1992, the entire US machine-tool industry, if controlled by one company, would not have made the Fortune 100 (CTII, 1994). Also the scale of the firms is rather limited. In 1997 in the Cecimo Area<sup>2</sup> there were 1,449 machine-tool establishments. In total 154,920 people were employed in the sector, with an average of just 106.92 employees per establishment. The largest number of firms in the Cecimo area is found in Italy. It has 450 establishments and an average of only 66 employees per establishment. The other major producer in Europe is Germany with just 320 firms, but a much higher, though still small, average size of 200 employees. The average scale of such firms in Japan is 271.

In spite of its limited dimension, however, this sector is one of the most strategic in the manufacturing sectors. In fact, as machine-tools are employed in the production of other machines,<sup>3</sup> they represent the primary production equipment for the metal working industry. On average, this industry generates 40% of the whole value added of manufacturing industries (Carlsson, 1989). A strong domestic machine-tool sector can provide user industries with a competitive advantage<sup>4</sup> in production techniques vis-à-vis their foreign competitors. Having to rely on imported tools would mean exporting a wide range of manufacturing know-how. It would also mean ignoring the advantage of the geographical proximity between producer and user, an important factor when machines become highly engineering intensive.

Some authors have argued that greater globalisation, with the associated reduction of trade barriers, lower costs of transport and better communications, have progressively eliminated some basic advantages enjoyed by local suppliers. This is because new technologies are available to potential users in any part of the world,

---

<sup>1</sup> In 1990 metal cutting machine-tools accounted for 76.4% of the total world machine-tool production (American Machinist, 1991, p.36).

<sup>2</sup> Cecimo comprises 14 European countries (Austria, Belgium, Czech Rep., Denmark, Finland, France, Germany, Italy, the Netherlands, Portugal, Spain, Sweden, Switzerland, the UK) and in 1997 accounted for 46.8% of world production of machine-tools (Japan, 27.6% and the US 13%) and 36.7% of world consumption (Japan 10.6% and the US 20.5%).

<sup>3</sup> The Chinese call them "mother machines" (Miao, 1993).

<sup>4</sup> "Though a firm can have a myriad of strengths and weaknesses vis-à-vis its competitors, there are two basic types of competitive advantage a firm can possess: low cost or differentiation. The significance of any strength or weakness a firm possesses is ultimately a function of its impact on relative cost or differentiation" (Porter, 1985, p.11). A strong domestic machine-tool sector is important for both strategies, low cost and differentiation.

with either negligible or short time lags (Carlsson, 1989).<sup>5</sup> However, given the strategic importance of close, long-term relationship between producers and users of machine-tools in the innovation process, we think that a strong domestic machine-tool sector is still essential to the success of a country's metal working industry.

Typically, innovations in this sector are of an incremental type and this is confirmed also by the very low value of R&D intensity (e.g. R&D to turnover ratio). In fact, as reported by Sciberras and Payne (1985, p.83), formal research and development does not play an important role in the degree of innovativeness of machine-tool firms. With very few exceptions, most of the machine-tool builders do not maintain formal R&D activities. The level of R&D expenditure is generally around 1 to 2% of turnover and only few firms in Japan were found to devote a higher share of turnover to research activities. More recently, Grosse (1999) reported for German firms a R&D intensity of around 3.6% in this sector with an increase of nearly one percentage point since 1979.

This situation is not only the result of the characteristics of the technology utilised in the production of machine-tools but also of the average dimension of the machine-tool builders and of the extreme cyclicality of the sector which "leave the machine-tool builders unable to sustain internally financed R&D programs over the long run" (Wieandt 1994, p.427). In fact, as argued by the National Academy of Engineering, "perhaps the most important trait associated with the machine-tool industry is the extreme cyclicality of its income, profits and cash flow" (NRC, 1983, p.10). This is mainly due to the high cyclicality in the investment patterns of the two main important customers, namely the automobile and aerospace industries.

Other important aspects of the sector under consideration are the high capital intensity of its manufacturing process, as also machine-tool builders employ machine-tools, and as it can be seen in Table 4.1, the high level of total exports.<sup>6</sup> For example, in the Cecimo area, between 1990 and 1997, firms have always exported more than 50% of their production.

---

<sup>5</sup> A real-time transfer of technology is more realistic now than in 1989 when Carlsson wrote his article. In fact, according to a 1990 machine-tool study at General Motors the time lag between the US, Japan and Germany was still one-to-two years (Chaponniere, 1990).

<sup>6</sup> Given the average low dimension of machine-tool firms, foreign direct investment is not common and builders tend to rely mainly on local distributors.

**Table 4.1 Ratio Export/ Production**

Country	1990	1991	1992	1993	1994	1995	1996	1997
<b>Cecimo</b>	0.60	0.59	0.63	0.73	0.72	0.65	0.68	0.66
<b>Japan</b>	0.36	0.34	0.42	0.54	0.64	0.73	0.76	0.69
<b>Korea</b>	0.10	0.13	0.21	0.19	0.22	0.21	0.39	0.35
<b>US</b>	0.29	0.29	0.36	0.29	0.35	0.30	0.32	0.26
<b>Taiwan</b>	0.68	0.65	0.64	0.68	0.67	0.71	0.76	0.75
<b>China</b>	0.31	0.16	0.12	0.12	0.14	0.15	0.15	1.19

Source: Cecimo (1998).

### **4.3 Historical background**

The first machine-tool was built in the late eighteenth century in Britain by John Wilkinson, who developed a new type of boring mill for the cylinders of James Watt's improved steam engine. Since then and up to the middle of the nineteenth century, Britain has been the leader in the sector and British machine-tools became to be regarded as standard all over the world. However, with the shift in demand towards more specialised, faster and more precise machines caused by the diffusion of the "American System" of mass production, the highly customised British machines progressively lost their leadership and the US took over as the leading producer.

Further developments in the US came during the second half of the nineteenth and beginning of the twentieth century encouraged by the fast expansion first of the bicycle and later of the automobile industries. The outbreak of WWI and the Great Depression stopped the growth of the industry, and between 1929 and 1932 machine-tool production in the US declined from 50,000 units to one tenth of that figure (Sciberras and Payne, 1985).

The downturn period ended with the outbreak of WWII, which stimulated both US arms and military aircraft productions and as a consequence domestic machine-tools demand. In 1955 around 40% of the world's production of machine-tools took place in the US, which managed to keep its leadership position until the end of the 1970s, even if with a much lower percentage (17.7%).

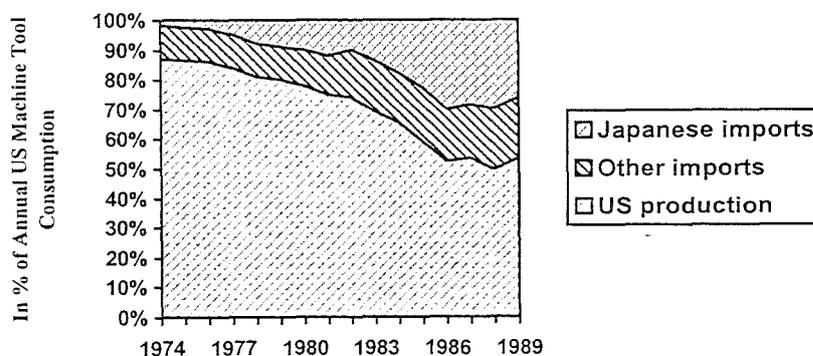
Table 4.2 Shares of machine-tools production in some producing nations 1975-1987. (%)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Japan	7.8	8.3	10.6	12.3	12.6	14.3	18.3	17.0	18.1	23.2	24.2	23.8	20.5
US	18.0	16.0	16.1	15.8	17.7	18.0	19.5	16.8	10.8	12.6	12.4	9.5	7.8
F.R.G	17.6	17.8	17.4	17.8	17.5	17.6	15.1	15.7	16.4	14.6	14.5	17.9	19.9
Italy	6.4	5.5	5.8	5.6	5.9	6.5	5.9	5.1	5.3	5.2	5.1	5.6	6.8
France	5.0	4.9	3.9	3.8	3.8	3.6	3.1	2.8	2.9	2.0	2.3	2.3	2.3
UK	5.3	4.8	3.9	4.3	4.4	5.2	2.7	3.5	2.9	2.0	2.5	1.3	2.8
Switzerland	3.9	4.0	3.8	4.0	4.1	3.7	3.2	3.6	3.9	3.4	4.3	4.9	4.7

Source: American Machinist, various issues.

As shown in Table 4.2, by 1987, the US share of world machine-tools production had dropped to 7.8%, nearly one third of the Japanese (20.5%) and less than half of the German ones (19.9%). In the same year, the Italian percentage share was 6.8%, just 1% lower than the American one. In only 12 years the Japanese percentage share of world machine-tools production rose from 7.8% to 20.5%, whereas the British one dropped from 5.3% to 2.8%. In only seven years (1980-1987), US imports of machine-tools rose from 24% to 54% of total sales (See Figure 4.1). In the same period, more than two-thirds of US machine-tool producers with fewer than 20 employees closed down, and the US government had to resort to protectionism to defend the domestic market. Most of the world market share lost by the US was gained by Japan, which between 1965 and 1982 rose from sixth ranking to top producer and progressively expanded its share of the US domestic market. Germany and Italy, the other two leading nations, did not suffer much from the Japanese competition during the 1980s and grew in unison with world production.

Figure 4.1 Growing Japanese Import Penetration of US machine-tool market (in % of annual US machine-tools consumption), 1974-1989



Source: Wieandt (1994).

The 1991-1993 period witnessed one of the worst crises of the sector. The consumption, and as a consequence the production of machine-tools, dropped in most countries (See Table 4.3). Japan, Germany and Italy were all hit rather strongly and in 1998 had not yet gone back to the production levels of 1990. Only China and Taiwan were not hit by the crisis and they even managed to increase their production between 1991 and 1993. In spite of the crisis, Japan did not lose its leadership position, and in 1998 was still the world's largest producer and exporter, even if with a much smaller percentage share, followed by Germany, the US and Italy.

**Table 4.3 Evolution of machine-tools production in the first ten manufacturing countries in the world (million US dollars)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998
<b>Japan</b>	10,945	11,639	8,355	6,968	6,707	8,998	9,183	9,984	8,975
<b>Germany</b>	8,751	8,813	7,670	5,432	5,332	7,267	7,559	6,788	7,560
<b>USA</b>	3,472	3,123	3,073	3,087	3,701	4,547	4,522	4,905	4,619
<b>Italy</b>	3,706	3,470	3,092	2,109	2,326	3,278	3,765	3,446	3,645
<b>Switzerland</b>	2,320	2,092	1,714	1,362	1,726	2,144	2,104	1,964	2,120
<b>China</b>	822	1,446	1,685	2,970	1,904	1,857	1,742	1,700	1,702
<b>Taiwan</b>	944	963	1,040	1,112	1,230	1,629	1,977	1,817	1,589
<b>United Kingdom</b>	1,681	1,292	1,102	967	852	1,019	1,343	1,303	1,195
<b>France</b>	1,392	913	955	672	724	966	1,051	945	1,066
<b>Spain</b>	1,015	751	613	394	450	662	802	815	945

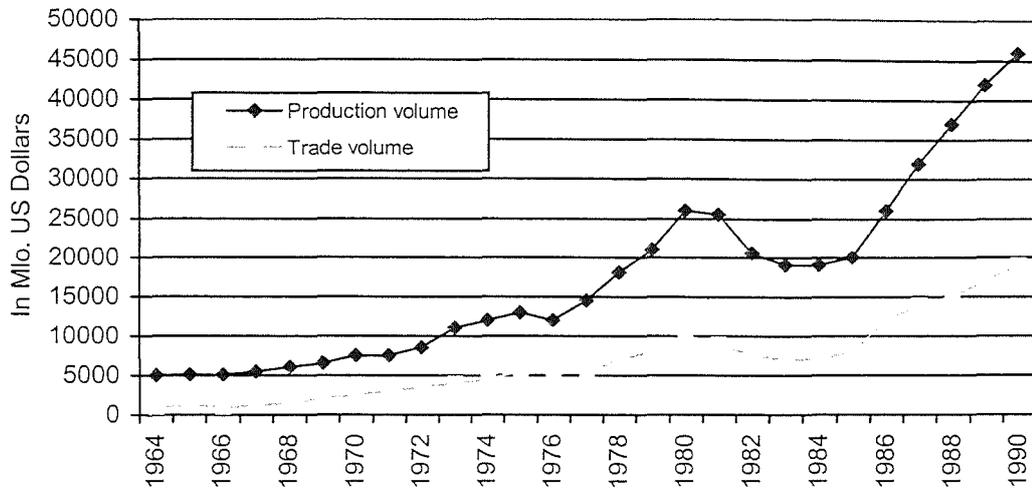
Source: UCIMU (1999).

#### **4.4 Characteristics of the sector in terms of *novelty*, *appropriability* and *visibility***

##### *Novelty*

Until the introduction of numerical controls in the 1970s, the machine-tool sector was characterised by a very low degree of *novelty*, having a very stable product technology, market structure and competitive environment. Innovations were mainly of an incremental type, realised by skilled machinists. The same basic lines of tools were sold for over 20 years and the design of a new line of products used to take several years (CTI I, 1994). The rate of growth of the industry was quite slow, especially if compared to the following period (See Figure 4.2).

Figure 4.2 Rising World Production and Trade of machine-tools, 1964-1990<sup>7</sup>



Source: Wieandt (1994).

During the 1970s, however, the diffusion of NCs (numerical controls) first and then of CNCs (computer numerically controlled machines) brought about a radical transformation in the system of production of the sector, so much so that several authors talk about a new technological paradigm. This new technology was first developed in the US in the early 1950s by the John C. Parsons Corporation, the US Air Force and the Servomechanisms Laboratory at MIT to produce highly complex metallic parts for the US Air Force. When first invented, NCs consisted of punched tapes, cards or operator push buttons that allowed programming and directing the operations of the machine (Wieandt, 1994). NC machine-tools permitted achieving a much higher flexibility than the previous specialised machine-tools. However, their diffusion remained quite limited, as they were very expensive and not reliable. Further, shifting from one type of production to the other required the substitution of hardware components (Carlsson, 1989).

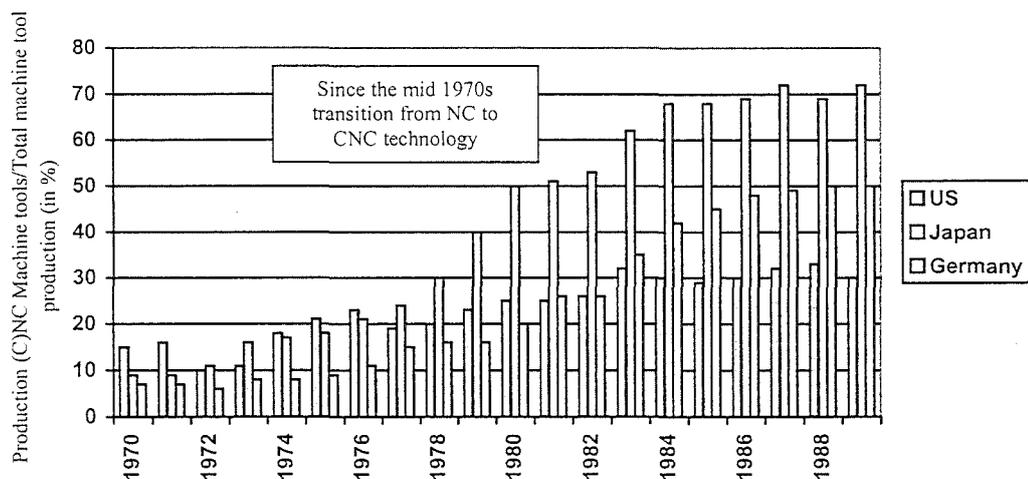
The significant diffusion of NCs occurred only with their evolution into CNCs, after the invention of the microprocessor (See Figure 4.3). A Japanese firm, FANUC, the current leader in controls production, was the first to apply the new

<sup>7</sup>The graph is sourced from a published article and as a consequence it was kept unchanged. However, it must be noticed that the use of "volume" in the legend of the graph contradicts the use of \$ millions on the vertical axis.

computer technology to machine-tools, starting in this way a new era in the history of the sector, with Japan as major producer and exporter.

During the 1980s, the production of CNCs as a percentage of total production of machine tools in Japan was always far above 50%, whereas in the US it never grew above 35%. Also Germany witnessed a profound growth in the production of CNC machine-tools and, in 1989, CNC machine-tools represented 50% of total production.

Figure 4.3 Production of CNCs as a percentage of total production of machine-tools



Source: Wieandt (1994).

The US, which originally had developed the NCs, failed to exploit the shift towards the CNC technology and in this way lost its former leadership. Japanese firms, in fact, used the new computer technology to produce low cost, general purpose, highly flexible machine-tools for the needs of small job shops, first in Japan and then in the rest of the world. “By simplifying the product, making it more general purpose, and aiming it at small and medium sized firms, they completely changed the market. The potential number of customers now suddenly numbered in thousands, rather than the hundreds” (Carlsson, 1989, p.184). By 1977 the production (number) of NC and CNC machine-tools in Japan had surpassed that of the US and only three years later it was nearly three times as great.

The US and Western Europe, on the contrary, were mainly oriented towards the largest, most sophisticated users of machine-tools. As a consequence, they concentrated on production, in small batches, of high-performance special-purpose

machines. As a matter of fact, the US maintained its leadership position in certain specialized markets (for example gear cutting machines), but the demand for these highly expensive machines is very small and shrinking and certainly not sufficient to offset the poor market penetration for general purpose CNCs machine-tools.<sup>8</sup>

The introduction and application of CNCs has certainly been the most important technological change in the machine-tool industry in the last 30 years. After the mid-1970s, in fact, things started changing much more rapidly. As shown in Figure 4.2, since then both the production and the trade volume of machine-tools have grown at a much faster rate. In addition, the product life cycle has been much shorter and firms have been forced to redesign their products every five years, or even less, to keep up to date with the new advances in microelectronics and sensing devices.<sup>9</sup> The redesign process is now mainly measured in months (CTI I, 1994). Machines have progressively been sold within flexible systems, which require a greater degree of compatibility and reliability and special after-sales assistance. In addition new markets have been invented (Sciberras and Payne, 1985) and competition is now more intense and globalised. In fact, the number and type of competitors has broadened to the newly industrialised countries (Taiwan, Spain, Korea), which produce not only low-priced conventional tools but also increasingly more sophisticated CNC products with the aid of technology licensed from Japan.

The application of CNCs to machine-tools, therefore, did not represent an isolated radical technological innovation. It was, in fact, followed by a series of other innovations, mainly as a result of innovations in other sectors, such as the development of new materials or the semiconductor technology. As the representation in Figure 4.4 shows, these have helped to sustain *novelty* to a relatively high degree.<sup>10</sup>

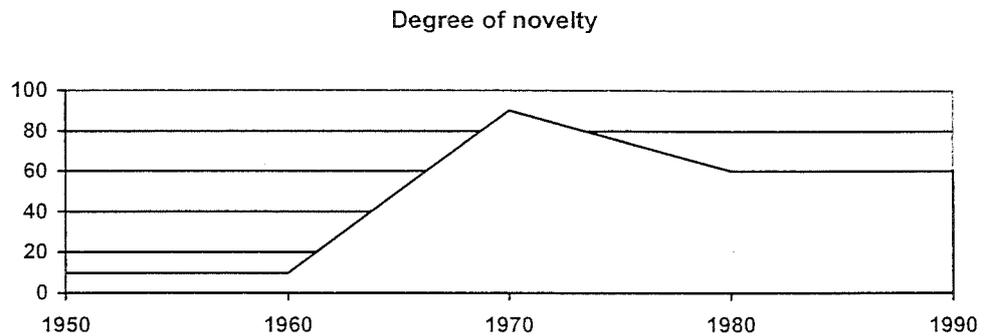
---

<sup>8</sup> See CTI I (1994).

<sup>9</sup> "According to one of the leading Japanese CNC lathe builders, a design made in 1974-75 had a lifetime of eight years; while a design introduced in 1978 was being phased out in early 1983 and the expected lifetime of a design put on the market in 1983 was around three years" (Jacobsson 1986, p. 89 as reported by Carlsson 1989, p.179).

<sup>10</sup> Examples of the most recent innovations are: parallel kinematics, the use of lasers in material processing and linear direct drives (new highly dynamic drive elements with a simple structure for direct generation of linear movements).

Figure 4.4 Representation of the change in the degree of *novelty* of the machine-tool sector



### *Appropriability*

The introduction of CNCs has influenced also the level of *appropriability* in the sector increasing the importance played by various stakeholders in the innovation process.

The technology involved in the machine-tool sector is in fact of the *object-oriented* type.<sup>11</sup> It involves producing a fixed object like steel or automobiles. This kind of technology requires a high degree of accumulation of skills on the shop floor. In fact, since the invention of the first machine-tool, innovations in this sector were mainly the result of the activity of skilled machinists. Their *inclusion* was therefore essential for companies to innovate effectively. Indeed, for a long time this group of employees had strong bargaining power and enjoyed high levels of responsibility within the successful machine-tool firms of the 19<sup>th</sup> and early 20<sup>th</sup> century. For example, Lazonick (1990) reports that in Britain in the 19<sup>th</sup> century senior workers, usually known as the “aristocracy of labour” not only provided their own knowledge and skills to the building and operation of machinery but also recruited junior workers, whom they trained and supervised on the shop floor. During the 20<sup>th</sup> century in the US, by contrast, the few skilled workers were appointed to middle management and the application of Tayloristic methods of production progressively took (and kept) learning off the shop floor (Lazonick, 1990).

The introduction of CNCs imposed the *inclusion* of a much larger group of employees. This was for two main reasons. First, because the adaptation of computers to machine-tools is a very complex operation and new skills requirements

have become crucial to combine mechanical (cutting and forming) and electronic technologies (both hardware and software). Such operation requires “increased math and literacy, computer programming, electronic maintenance, statistical process control” (CTI, 1994). This, as argued also by Soskice (1999), means that employees have to invest early in their career in the acquisition of industry-technology and company specific skills, which commit them, at least partially, to a particular occupation and company. For this reason there has to be a form of *inclusion* that not only guarantees employment security but also a stable system of wage determination and skill certification.

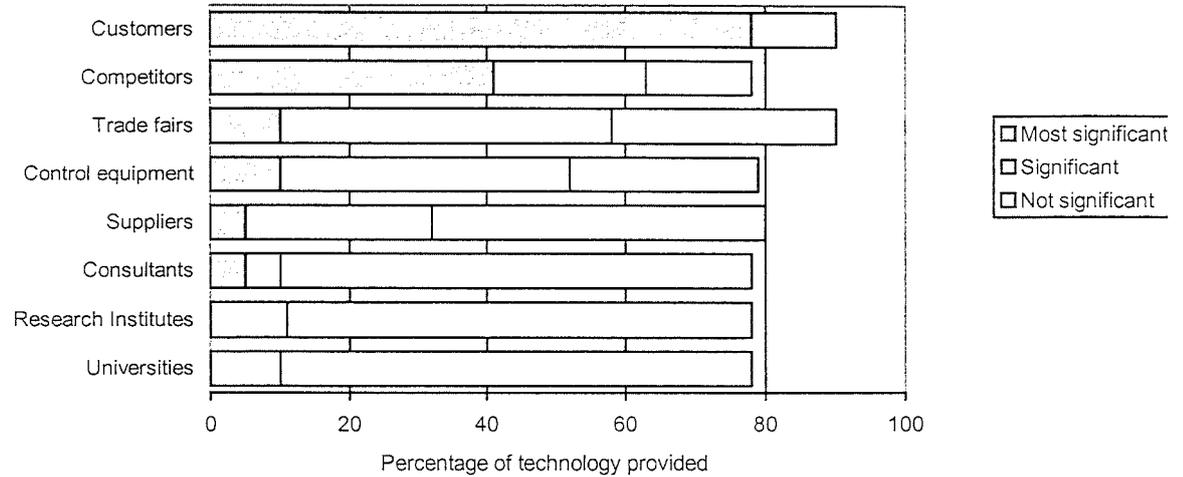
Second, for shop floor employees to work and innovate effectively, they need to be organised into autonomous groups. These are costly for management to monitor and impossible to explicate contractually. Furthermore, as employees hold the problem-solving knowledge, it is seldom practical for managers to have unilateral control over decisions. A formal or informal consensus-based approach to decision making (*inclusion*) appears therefore to be the best strategy.

In addition, as training on the job is no longer adequate and the employees need to accumulate specific skills before being employed, educational institutions become more powerful stakeholders in the innovation process of machine-tool builders. Firms need to build strong and stable relationships in order to influence teaching modules. This extends to organizing specific training activities cfr. the dual apprenticeships of Germany, Austria and Switzerland or the vocational colleges in Sweden. Such schemes are relevant both to those who are to work on the shop floor, and to those who have engineering degrees.

---

<sup>11</sup> See Itami (1994) and Chapter 1.

Figure 4.5 External sources of technology for machine-tool firms



Source: Gordon and Krieger (1993, p.25) as reported by CTII (1994).

Customers are other crucial stakeholders in the innovation process as they express specific needs that are then translated into innovations by the machine-tool builders.<sup>12</sup> A study by Gordon and Krieger (1993) on 35 American machine-tool builders (See Figure 4.5) showed that customers are the most important sources of innovation, followed by competitors and trade fairs. Universities and research institutes on the contrary, seem to play a limited role.

Similar results, on a much larger sample of firms were found by the CIS survey (See Table 4.4). In every European country that participated in the survey, customers were considered to play an essential role in the process of innovation of manufacturers of machinery and equipment, followed by the competitors and by trade fairs. Again, universities and government laboratories appear to be the least important sources of innovation in this sector.

Close long-term inter-firm relationships with customers appear therefore to be essential, in order to facilitate communication and interaction, to share proprietary

<sup>12</sup> Also Porter (1979) refers to customers as one of the 5 competitive forces that determine industry competition and with their bargaining power could appropriate part of the returns of a firm's investments.

information with no risk, and to co-operate in the design of new machines. Moreover, given the high working capital requirements for producing machine-tools and the limited average scale of machine-tool builders, customers could also provide up-front deposits and in-process payments.

**Table 4.4 Sources of information for innovation. Ranking of the different sources of information according to their perceived importance (1=most important). Nace code 29: Manufacture of machinery and equipment N.E.C**

	Italy	Germany	France	Spain
Within the enterprise	1	6	1	4
Suppliers of materials and components	4	4	6	7
Suppliers of equipment	6	7	5	5
Customers	2	1	2	2
Competitors in your line of business	5	3	7	1
Consultancy services	8	12	12	8
Universities/higher education	10	9	10	12
Government laboratories	11	11	11	11
Technical institutes	12	10	9	9
Patent disclosures	9	8	8	10
Professional conferences, meetings, professional journals	7	5	6	6
Fairs/exhibitions	3	2	3	3

Source: CIS database (1999).

As for the suppliers, Figure 4.5 and Table 4.4 suggest that their role in the innovation process of machine-tool builders is not of central importance. However, a distinction needs to be made between those who supply control systems and those who supply parts of machine-tools. The former have played a crucial role in the development of NCs and CNCs during the 1970s and 1980s and those firms that were able to establish close relationships with them enjoyed a strong competitive advantage. As argued by Sciberras and Payne (1985, p.40), “there is no evidence to suggest that either barriers to access to the new technology or prices at which the components were available were factors in the varying willingness or ability to adopt the new numerical controls in these countries. The most significant factors appear to be the attitudes or strategies of the NC suppliers and the relationships between the suppliers and the machine-tool industry in the different countries”. In fact, American and European suppliers of control systems ignored the machine-tool firms’ needs for cheaper and more flexible NCs. On the contrary, the Japanese (mainly the leader Fanuc) focused on the development of controls, which appeared to be “the most appropriate for flexibility and low cost, given the competitive concern of the general

purpose machine-tool industry” (Sciberras and Payne, 1985, p.41). With few exceptions, most American and European machine-tool builders had to develop their own in-house controls, dissipating in this way considerable resources and time.

It is the suppliers of parts other than control units, who do not appear to play an essential role, as firms tend to subcontract only simple or non-strategic parts.<sup>13</sup> In a recent study by Delmestri (1998), who interviewed several machine-tool builders in Italy and Germany, it emerged that very few of them had confidence in the ability of suppliers to attain good quality standards and to maintain the required levels of secrecy.<sup>14</sup> Those firms that outsource complex parts, also extensively apply inter-firm long-term co-ordination mechanisms to increase mutual confidence. Such mechanisms are supplemented by: pricing policies independent of cyclical downturns; the integration of the suppliers in production planning; the sharing of CNC programmes and production know-how; the precise definition of contract terms, with basic guidelines and sometimes price per quantity; and finally the property rights. Those machine-tool builders who actually have close long-term relationships with their suppliers declared that they experience important reductions in their costs and an increase in their quality (Delmestri, 1998, p.656).

Only in Japan, do suppliers seem to have played a very important role. Japanese machine-tool firms are mainly assemblers. They buy over 70% of their components from outside specialised firms (Sprow, 1985, p.48). In this way they are able to exploit enormous economies of scale, and to offer products at a much higher speed and lower cost than any other competitor in the world. Melman (1983, p.58) reported that a small Japanese firm employing only 100 workers was able to produce 30 NC machines per month, when a firm of the same scale in the US or in Europe needed a year to produce the same number of machines. Moreover, the price offered by the Japanese was 40% lower than that asked by American producers for similar machines. Numerous key suppliers work interactively with the machine-tool builders in the development of new components. Makers often exchange and train the staff of suppliers, sometimes transferring certain technologies to suppliers to enhance their

---

<sup>13</sup> See the two case studies, Chapter 5 and Chapter 6.

<sup>14</sup> For example a producer that was interviewed said: “We keep hydraulic pieces inside because we have developed a good know how. We also keep other pieces inside because it would take too long to explain to the suppliers how to do it: in the long run, they would reach the same level of know-how but specification are so many that it is impossible to communicate them (there are two hundred ways of drilling holes in the working head)”, Delmestri (1998, p.657).

skills, increasing the quality of components while reducing their costs over time (CTI, II, 1994).

The higher reliance on trade secrecy is due to the perception of low effectiveness of patents by machine-tool builders. As reported by Grosse (1999) and confirmed by the results of the CIS database (See Table 4.5) and by several experts of the sector interviewed by the author,<sup>15</sup> patents are regarded as relatively ineffective and expensive as a form of protection of intellectual property. As a consequence, greater reliance is put on other instruments, such as, commonly, trade secrecy and complexity of product design. At root, this happens because most of the innovations that take place in the machine-tool sector are incremental and, as a consequence, are quite difficult to protect by patents.<sup>16</sup>

**Table 4.5 Methods of maintaining or increasing the competitiveness of product or process innovation. Nace code 29: Manufacture of machinery and equipment N.E.C**

	Germany*	Belgium	Denmark	Ireland
Patents	4	4	4	5
Registration of design	5	5	5	4
Secrecy	2	2	3	2
Complexity of product design	3	3	2	3
Having a lead time advantage	1	1	1	1

\* Italy, France and Spain did not include this question in the questionnaire.

Source: CIS database (1999).

Notwithstanding this perception, however, according to the recent study by Fleischer (1999), those firms that have relied more on patents as a form of protection have had much more successful results than those which have relied mainly on secrecy. This might be a sign of a recent transformation that needs to be borne in mind in studying the sector and the most suitable form of corporate governance.

In the previous section it was mentioned that the introduction of CNCs caused a momentary increase in the degree of *novelty* of the machine-tool sector and according to the theoretical framework this suggests that new start up firms with nothing to unlearn should have had an advantage<sup>17</sup> (if sustained by external financiers

<sup>15</sup> Mr Battaglia of UCIMU, Mr Poloni of Danieli and Mr Saccà from Stam.

<sup>16</sup> Based on the results of interviews with machine-tool builders and experts of the sector.

<sup>17</sup> See Chapter 1.

with a certain degree of *industry-specific expertise*). However, as the degree of *appropriability* appears to be rather low, especially so far as the role of the employees and their cumulated knowledge are concerned, it appears that new firms would lack all the close long-term relationships essential for success. A system of corporate governance characterised by a high degree of *inclusion* of the stakeholders therefore appears to be the most suitable in this sector.

### *Visibility*

In this sector we need to distinguish between the *visibility* to those who are outside the firm and the *visibility* to those who work in the firm. The *visibility* to the former group is very low. In fact even though the distance in time<sup>18</sup> is rather short (3 years)<sup>19</sup> if compared to chemicals and pharmaceuticals (10 years or more)<sup>20</sup> there are several other factors that operate in the opposite direction. The percentage of investments in low *visibility* expenses such as design and engineering is rather high.<sup>21</sup> Secrecy is crucial during the process of innovation. Indeed it is so important that it may be advantageous to control or limit strategic relationships with the suppliers. Patents are on average not considered effective and in any case they can only be used after the innovation is completed. Expenses in development are much higher than in basic and applied research.<sup>22</sup> Informal training and constant forms of collaboration between the sales, production and research units, which are rather difficult expenses to account for, are essential to the process of innovation. It is therefore rather difficult for those who do not work actively within the firm “to judge whether the firm should be funded and to monitor progress” (Tylecote and Conesa, 1999, p.27). This is so unless they have developed a *firm-specific perceptiveness*, which is all the better if compounded with a good understanding of the industry, of its technology and of its general characteristics.

---

<sup>18</sup> The time “between the expenditure of money (and time and effort) on innovation and the point at which its value can be justified (or not) through sales, or profit/cash flow, resulting” (Tylecote 1999b, p.2).

<sup>19</sup> As reported by experts in the sector.

<sup>20</sup> As reported by Ramirez and Tylecote (1999).

<sup>21</sup> See Table 1.3, Chapter 1.

<sup>22</sup> “Visibility also depends on the way in which the innovation and the firm are organised: the more centralised, the more visible. Industries also vary in this respect. It is easier to centralise the process when it largely revolves around basic and applied research, than when it revolves around development” (Tylecote and Conesa, 1999, p.27). See Table 1.4, Chapter 1.

As for the *visibility* to the second group (i.e. those who work in the firm), it appears quite high. In fact, the rather small average scale of firms,<sup>23</sup> due to the rather specialist products and the tendency not to rely on economies of scale<sup>24</sup> ensures that distance in space and hierarchical distance are quite low. Plants scale does not exceed a few hundreds square meters. Given the low intensity of R&D,<sup>25</sup> when a R&D unit exists, it is necessarily unique and rather small; foreign direct investment is not common; firms are frequently run by the owners/founders who have usually a very good understanding of the technicalities of the products and of the needs of the innovation process. Problems, however, could derive from the fact that for the process of innovation to be effective, managers need to delegate a large degree of responsibility to the employees. This, if not compounded with an “*inclusion* of the stakeholders” strategy, could obstruct monitoring and control.

Table 4.6 Summary of the characteristics of the sector and of the requirements in terms of corporate governance

Characteristics of the sector	Requirements in terms of corporate governance
<p><b>Visibility: Low</b>            High degree of expenditure in low visibility activities            Scarce effectiveness of patents (high reliance on secrecy in the production phase)</p>	<p><b>High <i>firm-specific perceptiveness</i> of those who finance innovation</b></p>
<p><b>Appropriability: Low</b>            Importance of close long-term relationships with customers and suppliers            Importance of accumulation of skills on the shop floor and of industry-specific skills</p>	<p><b>High <i>inclusion</i> of the stakeholders</b></p>
<p><b>Novelty: medium</b> with peaks mainly as a result of inventions in other sectors</p>	<p><b>Medium- high <i>industry-specific expertise</i> of those who finance innovation</b></p>

Given the small dimension of machine-tool builders and the consequent difficulty of relying only on internal sources of finance, the external financiers need to be characterised by a high degree of *firm-specific perceptiveness*. In addition, as the degree of *novelty* has been increasing (and it was definitely very high during the 1970s and 1980s) a good degree of *industry-specific expertise* could increase the possibility of achieving the appropriate and most effective spending on innovation.

<sup>23</sup> See Section 4.1.

<sup>24</sup> Japanese firms have been able to attain higher than the average economies of scale, but in comparison to other sectors the level of economies of scale achieved by machine-tool builders is rather low.

<sup>25</sup> See Section 4.1.

To summarise, a system of corporate governance characterised by a high degree of *inclusion* of the stakeholders,<sup>26</sup> a high degree of *firm-specific perceptiveness*, and possibly, of *industry-specific expertise* of those who provide the funds for innovation, appears to be the most suitable for the machine-tool sector.

On the basis of these considerations, in the next section we will compare the main elements of the American and Japanese corporate governance systems, by particular reference to the machine-tool sector. On the basis of this analysis, which uses mainly the existing literature on the topic, we will try to explain why the US failed in transforming their invention, namely NCs, into a successful product for the mass market, thus allowing the Japanese machine-tool builders not only to become leaders in the sector but even to become main exporters to the US.

#### **4.5 The decline of the US and the upsurge of Japan: an attempted explanation**

In this section, using Tylecote's framework we will explain why the decline of the US machine-tool sector in the 1970s and 1980s was inevitable. It was essentially because the requirements imposed by the new technology, namely NCs and CNCs, in terms of corporate governance, were not at all fulfilled by the system of corporate governance characterising the country during that period.

##### *Appropriability*

The first main important difference between the US and Japan consisted in the type of strategy adopted to cope with the low degree of *appropriability* of the machine-tool sector.

As mentioned before, there are three main groups of actors who play an important role in the process of innovation of any machine-tool builder, namely the employees, the customers and the suppliers. Moreover, so far as the development and improvement of NCs and CNCs is concerned, employees needed to possess both

---

<sup>26</sup> If the perception of the effectiveness of patents changed, the inclusiveness of suppliers and customers could be reduced but the employees would still have to be *included*.

cumulated experience on the shop floor and new skills that only the educational system could offer. Furthermore a good degree of collaboration between the latter and the machine-tool builders was important.

The strategy adopted in the US was mainly a *shareholders first strategy*, the main goal being to increase the value for the shareholders. The other important stakeholders in the process of innovation were not *included* but considered just as inputs in the production function. In Japan, instead, firms adopted an *inclusion* of the stakeholders strategy, having formed some sort of coalition with the other important actors in the innovation process.

As for the employees, for several reasons, in the US they could not play the same strategic role in the innovation process as they did in Japan. In fact, as reported by the CTI study (1994) one of the problems in the US machine-tool sector lies in the scarce skills of its employees. This is for two main reasons. On the one hand “there is a relatively low supply of skills, at all levels, flowing from the US educational system into the machine-tool industry” (CTI I, 1994, p.45). This is due both to a widespread lack of basics in literacy, mathematics and other scientific topics, and to a scarcity of personnel inclined towards a specialisation in engineering and technology. On the other hand, several factors discouraged the U.S. machine-tool firms from investing more to advance the skills of their workforce. These factors included: the widespread practice of “extracting skills” off the shop floor in the US;<sup>27</sup> the cyclicity of the sector; the risk of poaching from larger firms; and the fact that providing training usually meant providing basic literacy and numerical skills. Skills, and, by implication, historical knowledge of the manufacturing process, became expendable; machine-tools, it was reasoned, could serve as substitutes for highly trained workers. And, if a skilled machinist was needed, it was cheaper simply to offer money to one from a neighbouring firm, than to invest in an in-house apprenticeship programme (Farrant and Flynn, 1999). Therefore, on the one hand the employees did not have any assurance that investing in specific skills would lead to long-term employment, and on the other, the machine-tool builders did not feel the need to adopt an *inclusive* strategy, as the employees did not have any specific skill

---

<sup>27</sup> See Lazonick (1990). This was through “task disintegration” (or Taylorism), with the possible intention of avoiding “hold up”, but also with the possible consequence of labour disenchantment with the job quality.

that made them essential to the production and innovation processes. However, the American approach, which was central to the success of the previous paradigm of mass production,<sup>28</sup> contrasted with the requirements of the system of flexible production based, among other things, on the activity of highly skilled workers.

The situation in Japan was completely different. In fact, apart from employees having initial higher theoretical skills provided by the educational system,<sup>29</sup> they were also subject to much broader in-company training. This was possible as it was easier for Japanese firms to face the cyclical nature of the sector and offer lifetime employment. This was both because of governmental incentives and because of the higher degree of outsourcing (Sprow, 1985). Poaching of employees was and is uncommon in Japan, and employees themselves have always greatly valued the loyalty shown to the firm for which they are working. As a consequence, they are also much more willing to invest in their own skills as they have the certainty that they will be not laid off at the first period of downturn. In addition, as opposed to the progressive specialisation of tasks and reduction of autonomy typical of the US, in Japan the employees have always been strongly encouraged to participate in all phases of the production process. "Keeping their workplace and machine in good order is a responsibility assigned to the operators themselves, along with maintaining output, helping fellow workers and assuring that every part produced meets or exceeds quality standards [...] each worker is trained to correct the minor problems that often arise in the course of the day, to conduct regular preventive maintenance to monitor and adjust equipment, and to search continually for ways to eliminate potential disruptions and improve efficiency" (NMTBA as reported by Forrant and Flynn, 1999, p.184). "Scholars of Japanese manufacturing contend that much of the success enjoyed by firms is based on the full engagement of the hands and heads of front-line employees" (Forrant and Flynn 1999, p. 169). Another example of the important role assigned to employees' skills in Japan is offered by the CTI I (1994). "Japanese and German companies use their own factories as test beds for the latest tools, relying on workers to come up with new incremental improvements in products or the process of making them. This includes not only engineers (who are

---

<sup>28</sup> Ibid.

<sup>29</sup> In Japan and also in Germany, the general educational level of those who work in the machine-tool sector is much higher than in the US as manufacturing is held in high esteem and a much higher proportion of students qualifies in engineering and technology. See CTI II (1994).

scattered throughout their operations, not sequestered in the R&D department), but production workers as well. One leading distributor of both US and Japanese machine-tools said:

“The Japanese will purchase the latest million-dollar flexible manufacturing cell and put an engineer on it for the first few weeks to ensure that it is operating properly and to search for any ways of improving its performance. A typical US firm will stick an operator on it whose only skill is knowing the difference between red and green buttons (to turn the machine on and off). Then they wonder why they don't get the expected return on their capital investment (RAND firm visit, 1993).”<sup>30</sup>

The customers are another set of stakeholders who appear to have enjoyed a higher degree of *inclusion* in Japan than in the US. In the latter country, the relationship with the customers has been generally of an arm's length type, mainly with market transactions (a lot of emphasis was put on the price) and with a scarce or null participation of the customers to the innovation process, both in financial and technical terms. The only two customers with whom American machine-tool builders had a close long-term relationship were the defence and aerospace industries. However the symbiotic relationship with these public entities had the negative effect of keeping the focus of machine-tool builders on the high value added end of the market, very frequently with inefficient and ineffective methods of production.<sup>31</sup> And it was precisely the scarce attention given to the needs of small metalworking firms that offered the main scope to the Japanese machine-tool builders with their flexible and low costs products of penetrating the American market. The Japanese, in fact, thanks to the high modularisation of their products, the high division of labour (see paragraph on the importance of suppliers) and the co-ordination provided by MITI (Ministry of International Trade and Industry), which allowed a widespread diffusion of knowledge among competing and non-competing firms, were able to deliver flexible, less expensive, standardized and simple machine-tools in a much faster way than the American counterparts were. In the development of the products, machine-tool builders worked mainly together with their local customers, who very often belonged to the same group as in the case of Toyoda Machine Works, whose stakes

---

<sup>30</sup> CTI I, 1994, p. 49.

<sup>31</sup> The defence sector in particular has been responsible for not pushing the machine-tool builders to reduce the costs of production and shorten the delivery time. See the NRC report.

are in part owned by Toyota Motors, and Toshiba Machine controlled by Toshiba Corporation with a stake of 50.1%. These customers, not only provided a secure market for the products, but also financial and technical assistance and a large number of innovative ideas.

A close long-term relationship between suppliers and machine-tool builders is another distinguishing feature of the Japanese industry. In particular, as reported by several authors, the role played by the Japanese supplier Fanuc was central to the success of the machine-tool builders. Fanuc, in fact, began to collaborate with machine-tool firms in 1958, when together with Makino Milling Machine Company, it developed the first Japanese NC machine-tools. In the following decades, supported by MITI (Ministry of International Trade and Industry),<sup>32</sup> Fanuc became the main supplier of controls and thanks to its large market share (over 80% by the end of the 1970s), and high standardisation, strategy was able to offer simple and reliable controls which proved to be essential to the low cost strategy of the Japanese producers.<sup>33</sup> As mentioned by Wieandt (1994), the existence of this dominant supplier further reduced the cost of production for machine-tool builders, as the interface adaptation costs were limited. The numerous American computer makers, on the contrary, regarded controls for machine-tools as a small product market, if compared to their other computer operations, and never developed a close relationship with the machine-tool builders or a sufficient market share to enjoy important economies of scale. According to Sciberras and Payne (1985) machine-tool builders were treated as a second priority business and the attitude of the controller manufacturers was often of irritation and recrimination, rather than co-operation when divergences of interests occurred. American and European machine-tool producers often chose to develop their own numerical controllers or to resort to foreign suppliers.

As for the other suppliers, it appears that the degree of reliance of Japanese firms on them was much higher than in other countries (currently it is 53% in Japan vs. 41% in the US and Germany) so much so that Japanese firms are frequently

---

<sup>32</sup> MITI encouraged the machine-tool builders to buy from a single control producer. See Wieandt (1994, p.433).

<sup>33</sup> Fanuc had natural monopoly. The large economies of scale, and the consequent low cost (but high quality) of its controllers were at the base of the competitiveness of Japanese machine-tool builders.

referred to as assemblers rather than producers. There are no available data about the type of relationship between the American builders and their suppliers, but we are fairly sure of not being very far from reality in thinking that it was of an arm's length type and mainly market based, as it is typical of Anglo-Saxon countries.

### *Visibility and Novelty*

As for the *visibility* and *novelty* issues, it was mentioned above that in order to achieve the "appropriate" and most effective spending on innovation, those who provide funds should have a high degree of *firm-specific perceptiveness*, which could be all the better if compounded with a medium-high degree of *industry-specific expertise*.

Also with regard to these issues, the US and Japan exhibit several further differences. In fact, as mentioned before, during the 1970s and 1980s, several mergers and acquisitions took place in the US consisting mainly of the incorporation of machine-tool builders into large conglomerates. However, the acquirer typically had no *industry-specific expertise*, and did not use its shareholder power to acquire insider knowledge of the firm. Between 1977 and 1982, at least 64 between mergers, acquisitions, and purchases of corporate assets took place in the US machine-tool industry. This and other factors led to the elimination of about 200 establishments from 1343 in 1977 to approximately 1140 in 1982 (Carlsson, 1989, p.180). These conglomerates regarded their investments in machine-tools mainly as financial investments and the managers paid very little attention to what the technological requirements for success were. As argued by Carlsson, "although many US machine-tool firms have recently been taken over by large, diversified firms (conglomerates) the acquisition of machine-tool firms appear to be motivated more by financial and diversification considerations than by vertical integration. Thus, it is not at all certain that being taken over by such firms makes greater financial resources available to the machine-tool firms. In fact, the truth may be rather the opposite, as a number of US firms have discovered: it is difficult for typically low-yielding machine-tool firms to compete for funds with firms in more 'glamorous' businesses" (Carlsson, 1989, p.186). Further "a lot of machine-tool companies will either be sold or closed because they are in the hands of conglomerates who traditionally are pretty cold-hearted concerning their bottom line and their stock prices" (Sprow, 1985 as quoted by Carlsson, 1989, p.180). With reference to the same phenomenon, Sciberras and

Payne (1985) argued that “the machine-tool companies find themselves in competition with other divisions in the group for investment capital and therefore must show quick and large returns or be excluded from consideration for capital for new investment and for managerial rewards” (Sciberras and Payne, 1985, p.57). This seems to have played an essential role in hindering the degree of innovativeness of American machine-tool builders, as the research into, and development of, a new technology requires a long-term perspective, and the acceptance of higher short-run costs to obtain longer-term competitive benefits.

Those firms that remained independent, due to their limited scale and scarce or null support from both financial institutions and the public sector, did not have sufficient funds to invest in innovation and many of them were forced to close down. The CTI study, in fact, confirmed that it was and still is, very difficult for small machine-tool producers in the US to attract external capital. This is mainly due to high processing and transaction costs, which normally represent a high proportion of the capital required. These firms, therefore, usually had/have to rely on retained earnings and capital from family and friends, capital that could/can hardly be used to exploit business opportunities and develop new products or processes. In addition, the same study revealed that, even if financial institutions or state or local governments with a good *industry-specific expertise* in the machine-tool sector, and specialised in the financing of small firms existed, small machine-tool builders found difficulties in finding them and building a long and stable relationship. “Some business have reported talking to 50 or 60 financial institutions before finding a good match; even then, high turnover rates among loan officers may jeopardise the relationship. Many small firms just cannot afford this much diversion of management attention” (CTI I, 1994, p. 55).

In addition, American machine-tool builders in general, did not benefit from any sort of technological transfer from the public sector, as federal research activities were mainly directed towards specialized defence products, without any commercial utility (see for example the Man Tech program by the Department of Defense which was aimed at improving manufacturing processes among its suppliers). As for the universities, several factors, such as the higher interests in theoretical and science-based activities, the limited practical experience of professors and students, and the conflict between the desire to publish articles by the researchers, and the need to

preserve secrecy in firms, collectively impede good understanding and effective co-operation (CTI I, 1994, p. 39-40).

Another important aspect that needs to be highlighted is that American firms in general tend not to co-operate with each other. This, according to the CTI report is due to several reasons such as antitrust regulations; unwillingness to share proprietary information; poor export culture, which makes firms compete for the same domestic customers; and the importance given to free markets and independent entrepreneurs. An antagonistic attitude towards competitors impeded the achievement of any sort of co-operative agreement for research and development, which could have been important, given the financial constraints suffered by small machine-tool builders.

To summarise, for the US there is a need to distinguish between two main sets of firms, namely small and large firms. As for the small firms, their limited scale and therefore the short spatial and cultural distance and the direct involvement of the owners in the management of firms helped them to cope with the low *visibility* problems of the sector. However, the scarce *firm-specific perceptiveness* and *industry-specific expertise* of banks and other financial institutions; the limited approachability of the few institutions with some expertise on the sector; the scarce support for R&D coming from the public sector and from universities; the arm's length type of relationship with customers; and the lack of collaboration with other producers impeded the achievement of an adequate and effective spending on innovation and hindered the development of CNCs. As for the few large firms,<sup>34</sup> ideally they should have had many more opportunities to invest in innovation. This is both because of the higher willingness of banks and financial institutions to provide capital, and for their larger level of internally generated funds. However, as mentioned before, these firms (especially those within conglomerates) had to face a strong pressure for short-term results. This seriously limited the investment in research on new technologies that could have generated returns beyond the short-term.

---

<sup>34</sup> In the US the 15 largest firms make up nearly 70% of the production.

The situation in Japan was completely different for several reasons. First, the average higher scale of machine-tool builders was (and is) not the result of mergers and acquisitions, but of a long process of internal growth. Second, many of the firms belonged to *keiretsu*<sup>35</sup>, which, as opposed to the American conglomerates, provided export services, long-term financial support and often co-operative links with users. Third, Japanese managers appear not to have faced any type of short-term pressure. In fact, according to a NMTBA's analysis of 1981, Japanese managers had, among their main objectives, output volume and market share, as opposed to profit, and "worked doggedly towards long-term goals" (NMTBA, 1981, p.46) even sacrificing profits for several years if this could permit later success. Fourth, Japanese firms enjoyed strong support from the government through MITI (Ministry of International Trade and Industry).<sup>36</sup> As reported by Wieandt (1994), among the various actions that MITI took were: the designation of product markets to specific firms to avoid duplication of efforts; the foundation of the Japanese Export Trade Organisation which spread market information among firms; the promotion of demand,<sup>37</sup> granting long-term low costs government loans to firms in specific sectors for the purchase of new machinery; and the encouragement of machine-tool builders to standardise parts across a large number of machines, in order to reduce the costs of production. In addition, in contrast with the US, Japanese firms developed a strong network of inter-firm relations, to share technological knowledge and to avoid duplication of efforts and waste of resources. Finally, as shown in Figure 4.6, both large and small firms could count on the support of financial institutions and public funding. Small firms (1 to 299 employees) were mainly supported by People Finance Corporations, Small and Medium Enterprise Finance Corporations, Credit Unions and Credit Associations. Medium and large enterprises (more 300 employees), instead, were particularly supported by City banks, Regional banks and Mutual banks.

In summary, in Japan, machine-tool builders could benefit both from a large degree of *firm-specific perceptiveness* and from the *industry-specific expertise* of

---

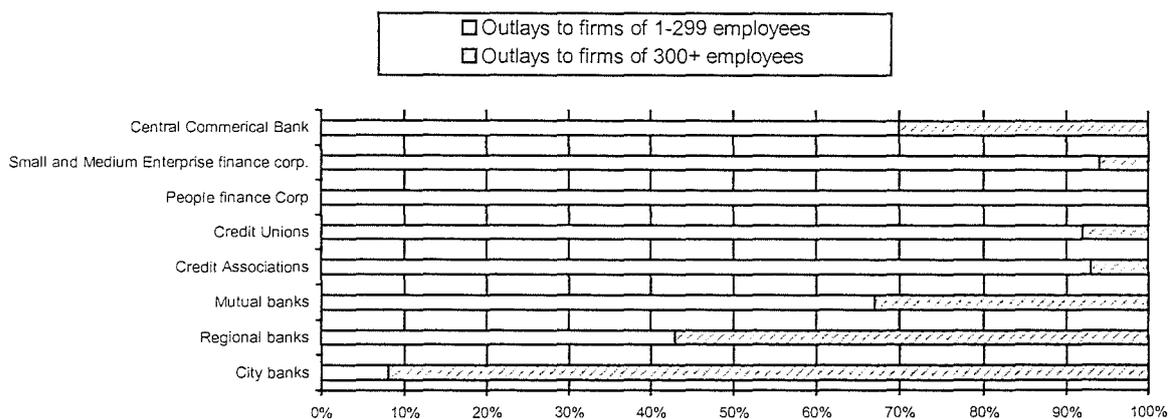
<sup>35</sup> *Keiretsu* refers to several types of business relationships. For example, vertical *keiretsu* are integrative relationships between suppliers and principals or producers and users. Horizontal *keiretsu*, on the other hand, involve integration of less structurally linked companies, such as between producers and trading companies (CTI II, 1994, p.1).

<sup>36</sup> Friedman (1988) sustains the opposite argument that MITI's actions did not have any effective result.

<sup>37</sup> See for example *Kikaikogyo Rinji Sochio-ho* (Temporary Measures for the Development of the Machinery Industry Law, 1956).

those who were providing the capital for innovation. Further, they had the support of the government (MITI), which appeared to have a very good understanding of the needs of the sector. In addition, the high level of co-operation with competitors, customers and suppliers, profoundly reduced the costs of developing the new technology and transforming it into a marketable product.

Figure 4.6 Outlays by financial institutions to small and large Japanese firms, 1966



Source: Friedman (1988, p.168).

To conclude, the main differences in the American and Japanese corporate governance systems appear to have been the following: the adoption of a *shareholders first perspective* combined with a short-term horizon in the US, as opposed to an *inclusion* of the stakeholders (customers, suppliers and employees) and a more long-term perspective in Japan; the lack of support from the public and financial sectors in the US, as opposed to the wide range of subsidies, loans and co-ordinating activities offered by MITI (Ministry of International Trade and Industry) and other financial institutions in Japan and an educational system oriented towards a pyramidal structure with a few highly specialised scientists and many non-skilled workers in the US, as opposed to the dual system of apprenticeship and vocational training in Japan. All these factors appear to have reduced during the 1970s and 1980s, the ability of American machine-tool firms of introducing innovations. This allowed Japanese builders to become leaders in the sector.

## 5. Case studies

### 5.1 Introduction

In this chapter and in the following, two case studies will be presented. As explained in Chapter 2, these are illustrative case studies, carried out to gain more information about the topic, namely the influence of corporate governance on the process of innovation in the machine-tool sector.

The first study concerns the typical firm in the machine-tool sector. It is a family owned business of 100 employees, rather successful and dynamic. The second “firm” is more accurately a group of firms, active in the minimills sector. It is a family owned business, with outsider shareholders. It has subsidiaries both in Italy and abroad, and a complex form.

In both firms we carried out a series of interviews. In the first firm, Stam, due to its small scale, we carried out three interviews: with the President and owner of the firm, Mr. Saccà; with the production manager, Mr. Lizier; and with a member of the technical unit (See Figure 5.1).

As for the Danieli Group (See Chapter 6) we carried on 5 interviews in the Headquarters, one in an Italian subsidiary, and 8 in the Swedish subsidiary.<sup>1</sup>

The two firms are both very successful, and as it will be shown, both of them have been able to adopt a type of organisation that copes well with the low *visibility*, low *appropriability* and only moderate *novelty* of the technology utilised in the machine-tool and minimills sectors and with the imperfections of the Italian system of corporate governance. The firms were founded in the same period but while one focused on a particular niche and maintained a small dimension, the second has progressively grown, both internally and through a number of acquisitions, and now it covers all ranges of products in its sector.

---

<sup>1</sup> A summary of the questions is reported in Chapter 2, Section 2.3.2.

# Stam

## 5.2 Introduction to Stam

Stam is an Italian firm operating in the machine-tool sector. It is the leader in Europe in the production of roll forming lines, and widely renowned for its capabilities in the working of coil, for the high quality of its cut-to-length lines and for the flexibility of all its systems. The firm, founded by Ing. Luigi Saccà in 1963, is a family-owned business with no external shareholders. It does not belong to a group of firms and it does not have any subsidiary. Currently it has a headcount of 129 persons. It occupies an area of 39,800 m<sup>2</sup>, of which 9,000 m<sup>2</sup> are covered. The turnover in 1999 was of 48 billion lire<sup>2</sup> (36 billion lire in 1998), and the production for foreign markets amounted to 94% (85% in 1998). For the level of turnover and for the number of employees (See Table 5.1), Stam can be considered as a medium-large firm in this sector. In fact, it ranks 50<sup>th</sup> in the list of the major producers of machine-tools in Italy (which are around 450).

Table 5.1 Italian machine-tool industry: number of plants by sales groups and by employee groups, 1997

Number of plants by sales groups (billion lira)	
<5	46.9%
5:10	16.6%
10:25	21.2%
25:50	9.1%
>50	6.2%
Total	100%
Number of plants by employee groups	
<50	68.8%
50:100	15.4%
>100	15.8%
Total	100%

Source: UCIMU (1999).

The firm is situated in Veneto, the region, which ranks third for number of machine-tool builders after Lombardia and Emilia Romagna, and also third, for number of employees, production and exports, after Lombardia and Piemonte.

---

<sup>2</sup> 1 billion lira corresponds to about 330,000 pounds sterling.

Figure 5.1 The organisational chart of the firm

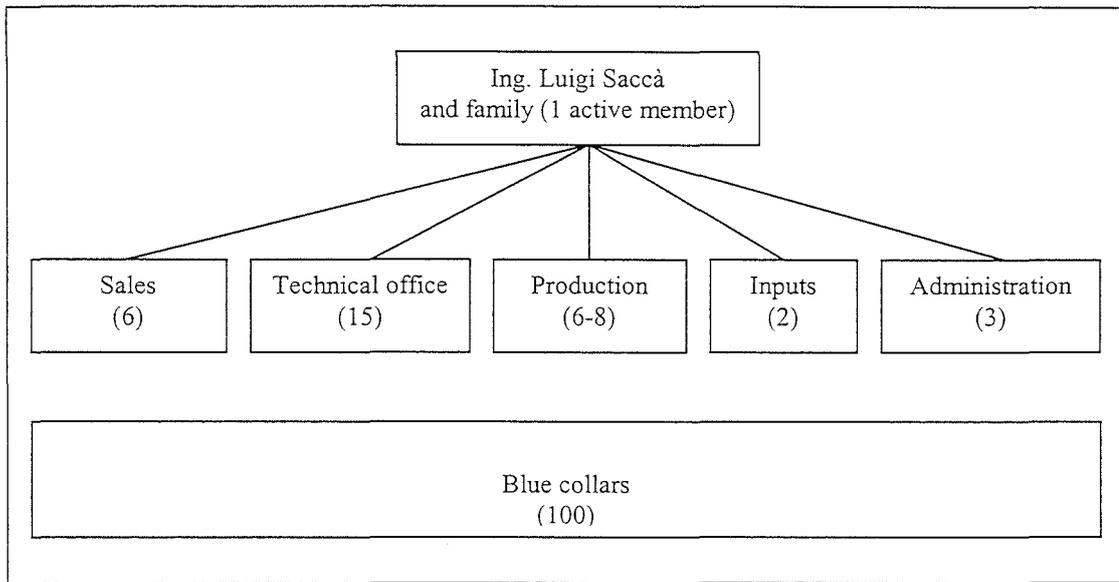


Figure 5.1 presents the organisational chart of the firm. Ing. Luigi Saccà, is the founder and current President of the firm and acts also as a salesman. His daughter, who has a degree in Engineering and started working for the firm a few years ago, is part of the technical office and contributes to the decisional processes. Ing. Saccà has also a son, who is currently studying Economics and in the near future will most likely join the firm.

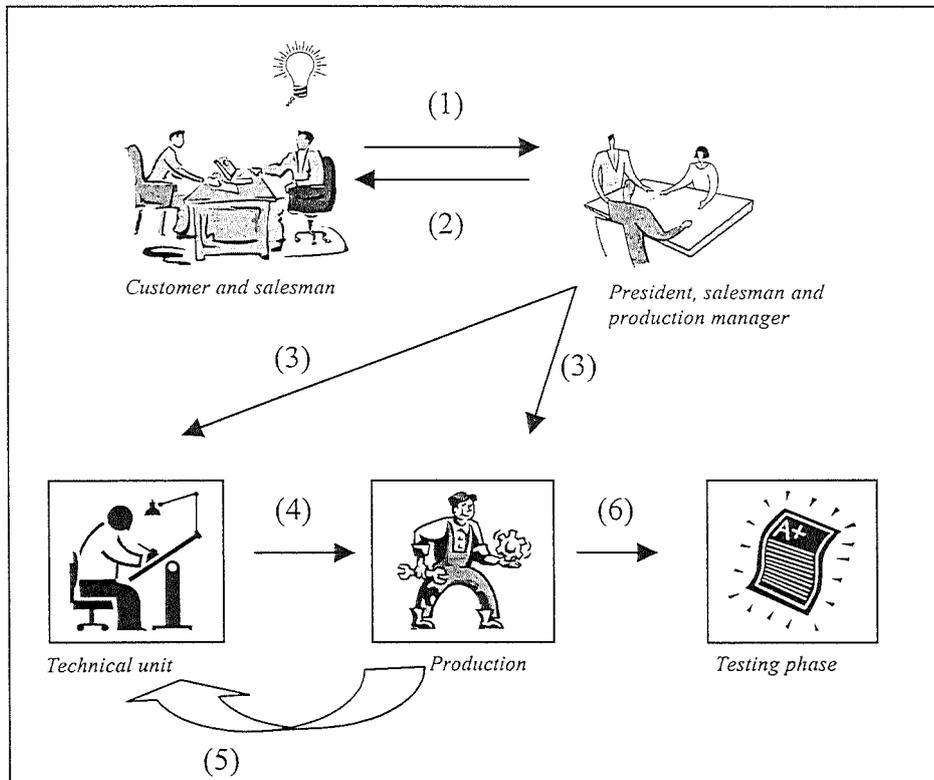
In addition to Ing. Saccà, there are 5 other salesmen in the firm. These people, as will be explained thoroughly in the following sections, play an essential role in the process of innovation. They act as a link between the firm and its customers, and usually provide the first idea for innovation. The technical office is composed of 15 members and it is in charge of implementing the solutions proposed by the salesmen for the customers' production requirements. The firm does not have a permanent R&D laboratory. Only three people deal with the administrative aspects assisted by an external independent *commercialista* (i.e. fiscal advisor). The production and the input units together compose around 10 people, and the remaining employees are blue-collar workers.

### 5.3 The process of innovation

#### *Internal visibility*

In a fashion typical of Italian machine-tool builders,<sup>3</sup> the machines produced by Stam have a very specialist nature, and are built in order “to achieve the best possible solution for the customers’ requirements”.<sup>4</sup> It can be argued, for this reason, that almost every machine embodies some degree of innovation. In general, the first innovative input is provided by the client, when expressing a particular need. The salesmen (the President plus other five employees) usually have the necessary expertise to suggest an appropriate solution (See Figure 5.2, phase 1).

Figure 5.2 The process of innovation



Its feasibility, the timing and costs, are evaluated together with the production manager (who is Mr. Lizier Isidoro). Then an offer to the customers is made (phase 2). If the contract is signed, the production manager fixes the timing for each

<sup>3</sup> See Chapter 7.

<sup>4</sup> See promotional booklet of the firm.

activity,<sup>5</sup> from delivery to designing, through a backwards process (phase 3). The technical unit implements the idea, prepares the projects, and passes them on to production and to the suppliers (phase 4). Several meetings with the customers, who usually make constructive suggestions, take place during the process. The testing phase usually takes between 1 and 3 months (phase 6). When the testing phase is concluded, the parts of the machine are sent to the customer's site to be put back together. As many as 2 or 3 employees at a time go to install all the parts, first the mechanics, followed by the electricians, the electronic technicians and finally by those who are experts in the software part. The maintenance is usually provided free of charge for one year, and beyond this it depends on the contract. The maintenance is carried out by the production unit.

Naturally problems of evaluation arise if the new machine is very innovative and different from anything produced before. Innovation can be achieved in no more than 2 days if it just involves a simple modification of an existing machine. This may extend to 2/3 months for very complex operations. In case a wrong estimate is made, either some of the resources employed in other projects are re-assigned to the more innovative one, or the production of some parts of the machine are sub-supplied. Thanks to the limited size of the firm, and the continuous flows of information through face-to-face formal (and informal) meetings, and through the intranet system, there is real-time updating on the state of each order. When problems arise, they are immediately dealt with by the responsible salesman, the production manager and very often the President. The employees in general feel that the time allocated for the completion of each task is usually sufficient and when it is not, more time is readily obtained. This good understanding between the various sections and with the product manager (Mr. Lizier), is probably due to his long-term experience in the firm. This amounted to 37 years, having occupied almost any position in the production unit.<sup>6</sup> This resembles the kind of wide training that Japanese managers and employees get. In addition, as mentioned before, the activities of the owners are not limited to administrative tasks. Ing. Saccà and his daughter are directly involved in the activities of the firm. The former is a salesman and is kept constantly informed about the situation of each order. The latter works within the technical unit where the

---

<sup>5</sup> A production meeting is held once a month. It involves the production manager and the 6 salesmen. During the meeting the point of the situation in terms of workload (expressed in terms of hours of work) is made so that it is possible to make provisions in terms of delivery time.

implementation of the innovative ideas takes place (See Figure 5.1 and Figure 5.2). In this way they both have a thorough and complete vision of the situation. In addition, every salesman follows his order until it is delivered to the customer.

The employees are encouraged to make comments and suggestions on how to improve the product. The ideas of everybody are considered and evaluated. There are not, however, forms of reward for those employees whose ideas are implemented, though there may be collective rewards for innovation.

Given its quite limited scale (albeit larger than the average Italian machine-tool builder), Stam does not have an in-house R&D unit. As mentioned before, every machine contains some innovative components. However, it is hardly ever the case that the firm produces innovative components on its own or provides solutions as a result of its own independent research activity. It is difficult to evaluate the level of R&D intensity. This is because there are no personnel dedicated to R&D. People who suggest innovative ideas or who contribute to their implementation, also perform other sorts of activities within the firm. They are identified as undertaking other activities rather than R&D. Making a comparison with the average intensity of R&D of the other firms in the sector (which is 1-2 %) is therefore problematical. However, the technological level reached by the firm appears to be quite high (as mentioned before they are leaders in the production of roll forming lines) thanks also to the activity of internal software programmers. As is the typical of Italian machine-tool builders, the majority of the machines produced by Stam are CNCs.

#### *Interfunctional collaboration*

The degree of interfunctional collaboration between the technical and the production units appears to be quite limited. The employee from the technical unit<sup>7</sup> that was interviewed, argued that they try to prevent problems before they happen but he admitted that the production unit offers some important ideas on how to modify the machines. The modifications suggested by the employees in the production unit can take between half an hour to half a day to implement and they are mainly software modifications. The President admitted that there are problems of communication between the two units, which in some cases can cause unproductive delays. Greater ex ante communication would speed up the production process and

---

<sup>6</sup> Unfortunately for Stam he was due to retire three months after the interview took place.

<sup>7</sup> Those who belong to the technical unit have less than 30 years, they are 15 in number and 8 of them have worked for more than 10 years. Two of them are engineers and the others have only a diploma.

avoid the recurrent ex post requests for modifications of the projects coming from the shop floor (see Figure 5.2, phase 5). At the time of the interview, a new employee had just been hired to operate at the junction of the two units. This should stimulate collaboration and produce very positive results but only in a medium-long term period, when this new employee will achieve a sufficient level of understanding of the firm, of the written and unwritten rules and of the process of innovation. In fact, as it has been pointed out several times in the literature<sup>8</sup> the production of new knowledge (i.e. innovation) is an interactive learning process, specific of every firm and based, among other things on a specific type of interpersonal relationship among those who are involved in the process itself. As a consequence, in order to give a positive and substantial contribution to the process of innovation, together with a good understanding of the sector and of the technicalities of the product, this person will have to invest in acquiring his own firm-specific knowledge.

#### *Sources of funding*

Apart from the problems connected to the scarce inter-functional collaboration between the production and technical departments, there do not seem to be particular obstacles in terms of internal flows of information, degree of *firm-specific perceptiveness* of those who provide the funds for innovation, cultural, hierarchical and geographical distances. Therefore, if sufficient internal funds are available, there should not be any difficulties, due to low *visibility*, in reaching the appropriate and most effective level and type of spending on innovation. As for external sources of finance, Stam uses them only for the financing of day-to-day operations and not for the financing of long-term innovative projects. This is a personal choice of the President, who prefers to rely only on internal sources of finance. However, he admits, that the banking system does not have any understanding of the sector and in order to obtain long-term loans, the firm would have to provide full collateral. This is a very widespread problem among Italian firms, which very often lament the lack of support from the banking sector,<sup>9</sup> especially if they are of small scale.<sup>10</sup> The situation of Stam is even more significant, considering that around 400 firms in this sector have a smaller scale and are therefore

---

<sup>8</sup> See for example Lazonick and O'Sullivan (1998).

<sup>9</sup> See Sciberras and Payne (1985) for other interviews in the machine-tool sector in Italy.

less likely to get the support of banks, if the entrepreneurs do not provide their house as collateral.

#### *Public funding*

This firm has applied for public funding (the Applied Research Fund)<sup>11</sup> only twice. In the first case, it was successful, whereas in the second case the project presented was considered not to be sufficiently innovative. According to the President it is very difficult to obtain public funds. Not only is the information about such schemes generally inadequately publicised, but even when it is not, the number of documents that firms are required to complete is very large, and the procedure is time consuming. As a matter of fact, it is renowned<sup>12</sup> that Italian SMEs find many more difficulties in obtaining support from the public sector compared to larger firms (see Danieli case study). This is so, even if they enjoy specific and simplified bureaucratic procedures. Unfortunately SMEs typically do not have sufficient resources to employ a person just to monitor possible sources of finance, and to fill in all the application forms.

#### *Inclusion of the customers*

As mentioned before, Stam produces highly customised machine-tools. Close cooperation with the customers is therefore essential. As a matter of fact, Stam has 364 customers, who tend to have a close long-term relationship with the firm. On the one hand, projects are specifically designed to satisfy the customers' needs. On the other hand, especially when the projects are particularly innovative, Stam's customers are required to finance part of the expenses through periodical instalments during the production process.<sup>13</sup>

Both firms enjoy an advantage from the close relationship. In fact, the client sees its own needs more effectively satisfied than if it had to buy a standardised product, as it can rely on a machine that could represent a competitive advantage in the market. At the same time, given its limited dimension and the scarce support from the financial system, Stam would probably not be able to finance its own

---

<sup>10</sup> As explained in Section 3.2.3.1, Chapter 3, this problem is in part overcome by referring to multiple banks. However, this system does not seem to solve the strong financial constraints of Italian SMEs.

<sup>11</sup> See Chapter 3, Section 3.2.7.

<sup>12</sup> See Chapter 3, Section 3.2.7.

<sup>13</sup> For a similar case see Reid (1993, p.142).

operations as the machines produced are very specific and embody a high degree of technology (worth between 255 thousands and 4,1 million euro). Stam would probably have to produce something more standardised and cheaper for the mass market. However, the mass market is dominated by the Japanese machine-tool builders, who have achieved a level of economies of scale and of associated low costs that would be very difficult to achieve by a small, integrated firm. In fact, whereas Japanese machine-tool builders are mainly assemblers and every part of each machine is produced by very specialised suppliers, in Italy (and indeed in Western Europe), there is a much lower reliance on subcontracting. Firms tend to produce most of the strategic parts internally. According to a recent study on the machine-tool sector in Germany and Italy by Delmestri (1998, p. 639-665), this is caused by the fact that it is very difficult to co-operate with suppliers, to achieve a good understanding especially on the qualitative levels, and to be confident of their trustworthiness.

#### *Inclusion of the suppliers*

The type of relationship Stam has with its six major suppliers is certainly long-term, but it cannot be defined as “close” as the sense of the term suggests. In fact, the suppliers are mainly asked to produce only the mechanical and most standardised parts, and always the same part, in order to reduce negative knowledge spillovers. In half of the cases, the engineering drawings are supplied by Stam. Suppliers seem never to have contributed in any way to the degree of innovativeness of Stam’s machines. All of the most strategic mechanical parts are produced internally. The CNCs Stam uses for its machines are standardised and supplied by a German and a French firm. The software that runs the CNCs is produced internally by expert programmers. In addition, also the process of “dressing” the machine, which consists of adding on the hydraulic, electrical and electronic parts, is done within the firm. These, together with the software programmes, are probably the most distinguishing features of a machine. We cannot therefore conclude that there is any degree of *inclusion* of the suppliers in the case of Stam.

#### *Inclusion of the employees*

Another group of stakeholders that, according to the hypotheses of the framework, should be *included* is that of the employees. The machine-tool sector, in

fact, as much as the other engineering sectors, is characterised by a low level of *appropriability*. It has an incremental type of innovation, which therefore requires a high degree of cumulative learning on the shop floor. As mentioned several times in Chapter 3, in Italy employees do not have any right of codetermination as they do for example, in Germany or Sweden. At the same time, given the limited scale of the average Italian firm, there is usually a quite close relationship between the entrepreneur and the employees, based on trust and a long-term, quasi-life time employment. The entrepreneur usually keeps under consideration the interests of his employees in the formulation of the company's strategy. In any case, it is very difficult, (though not impossible) for an employer to fire an employee without a proper reason. For these reasons, it was argued, in Italy employees can be defined as *included*.

In Stam the situation appears to be very much as characterised above. In fact, Ing. Saccà and Ing. Saccà are typical Italian entrepreneurs. They keep day-to-day contacts with their employees, and are especially close to those who have been working for the firm for a long time. There is substantial concern for their conditions and needs (even though Ing. Saccà, given the low level of unemployment in the Veneto region (3-4%), would not feel remorseful for laying off some employees if there was the need to). In any case, dismissing the employees is not a strategy that has been adopted, even in periods of downturn.

One of the imperfections of the Italian system, however, is that firms do not usually take advantage of the high degree of *inclusion* of the employees. In fact, the delegation of responsibility in Italy tends to be rather low. Firms do not always recognise the ability of employees to play an active part in the innovation process and capitalise on it. This is however, not the case in Stam, where there appears to be a rather high delegation of responsibility to the lower levels of the organisation, and a strong encouragement to every employee to participate in the innovation process.

However, given the environment the firm is in, we were expecting to find more instruments of appropriation. In fact, according to the President there is a very scarce supply of specialised workforce, due to the inefficiency of the educational system. Stam therefore has to train most of the new employees that join the firm. Nevertheless, there do not seem to be in Stam specific forms of incentive (e.g. a system of rewards) for preventing people, especially blue collars, from leaving the

firm. This is quite surprising, considering that to Italian employees, working for a machine-tool builder is not a very highly regarded job, and that changing jobs in the Veneto region is rather easy. In addition, in the past Stam experienced serious problems with the unions. Several strikes had occurred and in a few occasions the employees occupied the factory. Associated with this, a key employee had left, carrying with him important engineering drawings. It is certainly true that those employees who have been working longer in the firm, have the higher firm-specific skills. They represent strategic resources. They are also those who have the highest responsibilities (such as Mr. Lizier) as well as and the closest and most loyal relationship with the owners, enjoying in this way a stronger form of *inclusion*. However, given the high importance of “cumulative learning on the shop floor” for innovation in this sector (and hence the necessity to keep a low level of turnover), Stam should probably invest even more in its relationship with the employees (e.g. individual rewards for suggestions, etc).

#### *Relationship with competitors*

Italian industry is very often cited for the importance of its industrial districts, and for the collaboration that occurs between competing firms in the development of new technologies.<sup>14</sup> It is certainly true that the concentration of machine-tool builders is higher in the Piemonte and Lombardia regions, where networks of firms appear to work quite effectively. However, we were expecting that something similar happened also in the Veneto region. Instead, at least so far as Stam is concerned, no forms of collaboration are in place with competitors, either for technological innovations, or for other activities, such as export. On the contrary, the President finds that the relationship with the competitors is very tense. Competition is mainly of the interfering type and there is very little room for co-operation. The President in the past tried to set up an agreement: first with a German competitor (for the acquisition of a German firm); and then, with an Italian one (for the acquisition of a supplier in trouble). In both cases the agreement did not take place. In particular, the reaction of the Italian competitor was very harsh.

We were also expecting a more enthusiastic attitude towards UCIMU (Unione Italiana Costruttori di Machine Utensili), the Italian association of machine-

---

<sup>14</sup> See Chapter 7 for an example within the machine-tool sector. See also Brusco (1982).

tool builders. On the contrary, it appears that, apart from important information concerning trade exhibitions, the firm does not perceive many more benefits coming from being part of the association. It is thought not to be worth the more than 40 million liras paid per year. According to the President, the larger benefits are enjoyed by firms in Lombardia that are geographically closer to the main office of the association, suggesting nepotism and location-specific advantage.

#### *The degree of novelty*

As explained in the previous chapter, the level of *novelty* in the machine-tool sector has increased since the 1970s. This is so not only in technological terms (first with the introduction of numerically controlled machines, then of computer numerically controlled machines, and now of new and more sophisticated materials) but also so far as the structure of the market and competition are concerned. As a consequence, it has become more difficult for firms to compete. They need to keep up to date with the latest inventions in electronics, to defend the market share against a globalised competition, and to face the frequent and recurrent crises of demand in the sector. According to the hypotheses of the framework utilised in this thesis, when the degree of *novelty* is quite high, new firms, with the back-up of financial institutions with a high degree of *industry-specific perceptiveness*, are more likely to succeed than old and well established ones. If this were true, Italy would face (and should have faced during the 1970s and beginning 1980s) serious problems in this sector, given the low degree of *industry-specific expertise* of its financial institutions and the underdevelopment of its venture capital market. However, it was argued in Chapter 4, Section 4.3, the introduction of CNCs and of the other innovations coming from electronics, not only needed the availability of new skills but also the support of the old “cumulated on the shop-floor” ones. As a matter of fact, within Stam, the introduction of NCs and CNCs took place in a very gradual way. It did not represent a very radical break with the past, and problems of conservativeness did not occur. The demand for machine-tools, in fact, did not shift rapidly from normal machines to CNCs. The new needed skills were therefore progressively, but slowly, accumulated by the firm. In addition, it was argued by the President, as Stam mainly sells solutions to problems, and every produced machine is bespoke (i.e. different from the previous one), producing machines that work with numerical controls did

not represent something different from anything else done before. It was another example of finding a solution to a problem.

## Conclusion

The study of the machine-tool sector presented in Chapter 4, allowed us to conclude that the technology used in this sector has a low degree of *visibility*, a medium level of *novelty* and a low degree of *appropriability*. In addition, from Chapter 3 we know that the Italian system of corporate governance has certain key features. These are: a high degree of *firm-specific perceptiveness* of the shareholders; a low degree of *industry-specific expertise* and of *firm-specific perceptiveness* of financial institutions (with the exception of banks within industrial districts and banks related in some way to large firms); and a high degree of *inclusion* of customers, suppliers and employees. The study of Stam appears to be in line with our findings but it has also highlighted some aspects that are particular to Stam. Specifically we refer to the role played by customers in the financing of innovation and the scarce level of *inclusion* of the suppliers.

In fact, in the study of the Italian system of corporate governance we point out that medium-small firms outside the industrial districts, and not part of a group of firms, have difficulties in obtaining financing for innovative projects. This is true for either the banking system (unless they offer consistent warranties) or for public institutions. This case study of Stam has confirmed the existence of this problem. However, it has also revealed how SMEs, who are machine-tool builders, might overcome the limits of the Italian system of coping with activities characterised by low *visibility*. Here we are referring to their relying on the close long-term relations with the customers, who are required to make upfront payments for their highly customised machines. Other countries, such as the UK or the US, where firms mainly operate at arm's length, would not be able to cope with this kind of problem.

As for the suppliers, we argued in Chapter 4 that they were important stakeholders in the innovation process of machine-tool builders. We still have the same opinion. But this case of Stam has shown that, despite the role suppliers could play in the innovation process, the need for secrecy is very important. This is so much so, that, up until now, no forms of *inclusion* have appeared to offer sufficient protection. This is quite surprising as, even if a supplier serves more than a machine-

tool builder, there should be some forms of agreement that could ensure its trustworthiness. After all, Stam also has more than 300 customers, and, in many cases, machine-tools are at the basis of their competitive advantage. However, as it was explained in Chapter 3, Section 3.3.1, many firms are starting to internalise the production of their own machines. This is caused by the tendency of machine builders to create spillovers by selling the machine produced in collaboration with one firm to that firm's competitors. We think that problems of secrecy are very severe, not only within the machine-tool sector, but also within the sectors of the machine tool builders' customers. Effective forms of *inclusion* have still not been found or thought of. For some firms, the most convenient form of *inclusion* is that of internalisation. Other firms, that for one reason or another cannot internalise the operations that need to be kept secret, are forced to rely on suppliers, who might or might not adopt a correct attitude. In any case, for these firms, the costs incurred for internalising the operations would probably be higher than those of the spillovers to the competitors.

This does not mean, however, that more effective forms of *inclusion* cannot be found. We are convinced that if more effort were put into finding specific forms of beneficial agreements, Italian firms would achieve a much higher degree of innovativeness.

## 6. The Danieli Group

### 6.1 Introduction

The Danieli Group is a group of medium scale that works in the minimills sector. It is the leader in the production of minimills for “long products”.<sup>1</sup> The headquarters of the Group are situated in the North East of Italy. Subsidiaries are to be found in Italy, in various European countries and in the US.

The choice of this Group as one of the two illustrative case studies was explained partly in Chapter 2 and further in Chapter 5. In the first few sections of this chapter, the main characteristics in terms of *visibility*, *appropriability* and *novelty* of the minimills sector will be described. It will be shown that these characteristics are very similar to those of the machine-tool sector. This is not surprising as, in general, most of the engineering sectors possess similar characteristics. Further the minimills, in a sense, can be described as gigantic machine tools. We proceed with the study of the Danieli Group and of two of its subsidiaries, by using a similar structure to that we used with the case study of Stam.

### 6.2 The steel industry: two possible technologies

The steel industry is composed of two types of producers, those who use the traditional method and those who use the minimills.<sup>2</sup> In the first case (traditional method or full integrated method), iron and coke (the two elements that combined together give steel), after being processed to improve their quality, are combined in a blast furnace<sup>3</sup> that adds oxygen and fuses the materials into pig iron<sup>4</sup> (See Figure 6.1).

---

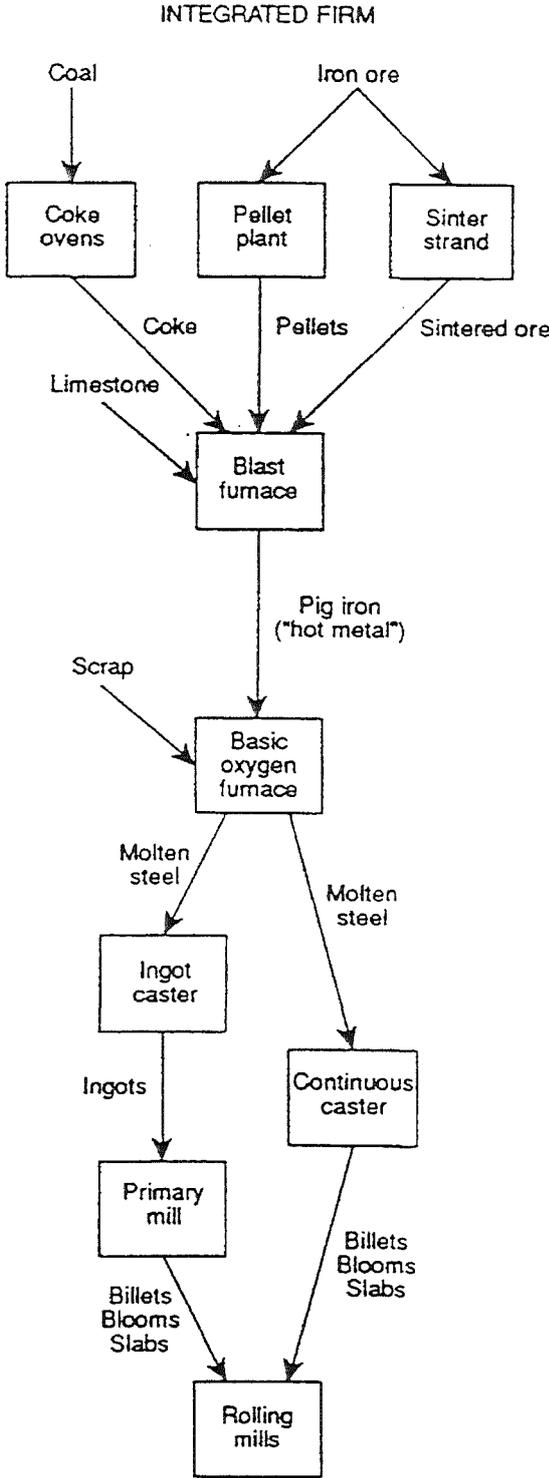
<sup>1</sup> Bars, rods, wire rods, light and heavy sections, rails.

<sup>2</sup> See Harvard Business School (1991).

<sup>3</sup> A blast furnace is a smelting furnace into which compressed hot air is driven.

<sup>4</sup> Crude iron from a smelting furnace. A different technology called direct-reduction iron process (DRI) allows purifying without melting iron ore into pellets of 90% to 95% purity. Another process is the HBR (hot briquette reduction). These advancements in technology reduced the use of blast furnaces.

Figure 6.1 Fully integrated process of steel production

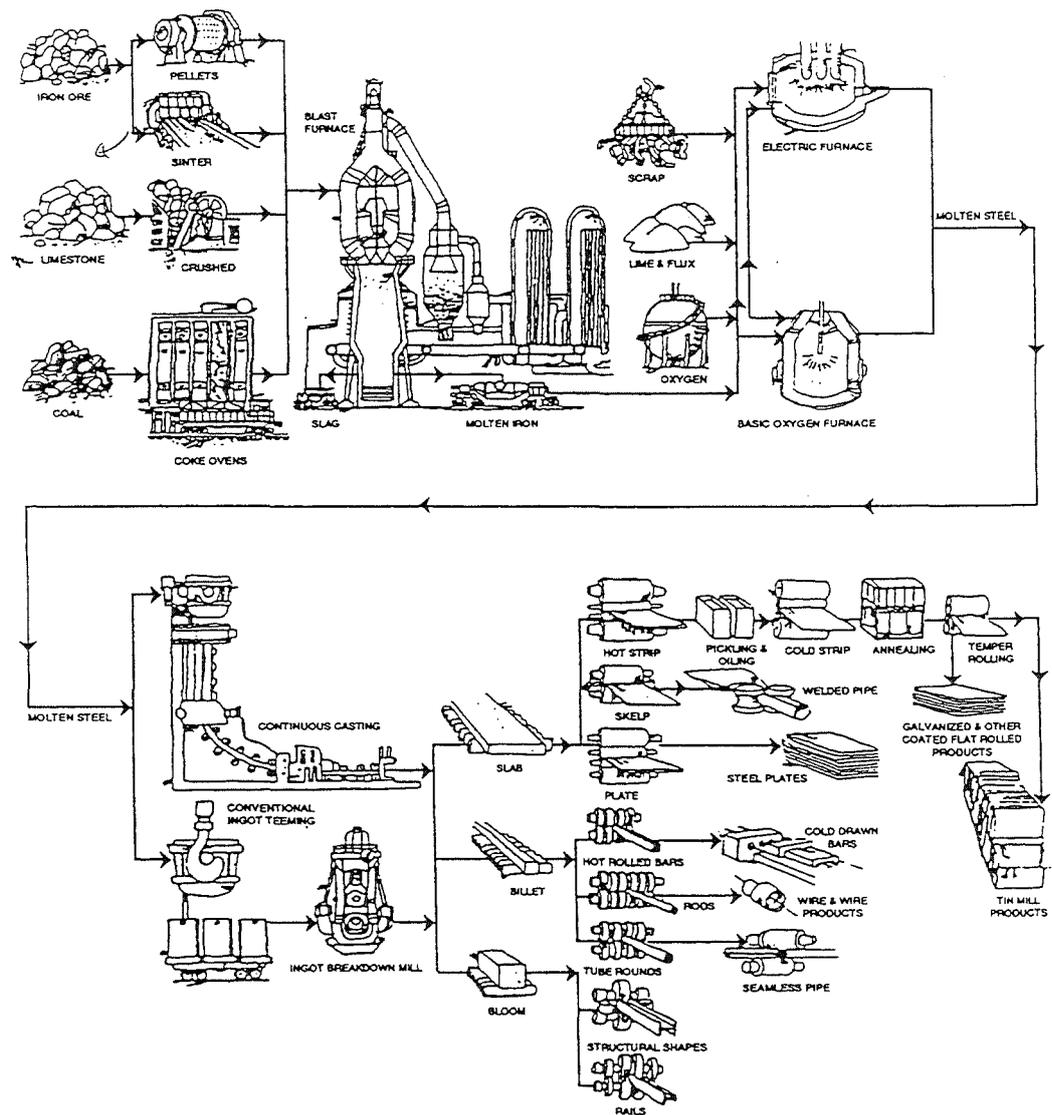


Source: Harvard Business School (1991).

Then, the steelmaking process heats the pig iron (sometimes together with scrap steel) in a second furnace (steel furnace) for further purification, which

removes excess carbon and impurities such as silicon or phosphorous using oxygen and other chemicals. Finally, the raw steel is shaped through casting<sup>5</sup> and rolling.<sup>6</sup> In the past, the molten steel was first poured or ‘teemed’ into a mould. Only after being held as inventory, in the form of ingots, it was passed on to the next step: the hot rolling mill.

Figure 6.2 Diagram of a traditional, integrated steel mill



Source: Harvard Business School (1991).

<sup>5</sup> The liquid iron is given a shape by pouring it into a mould.

<sup>6</sup> The metal is rolled into plates and bars.

This further processing involved a soaking furnace, which reheated the ingots and stands of rollers, which pressed the hot steel into its final shape, such as bars, rails or sheets. Since the invention of the continuous casting process in the 1960s, the molten steel does not need to be transformed into ingots and then reheated. Instead the slabs produced during the casting process are directly transferred, through rollers, to a shearing machine that transforms them into workable pieces. In general, every step of the production process to the final product, is carried out within the same plant. As the sector is highly capital intensive (in 1990 the initial investment was of the order of 1000 billion lira)<sup>7</sup>, it utilises economies of scale as its primary competitive advantage. As a consequence, this method is characterised by considerable inflexibility.<sup>8</sup>

The second method (minimills), instead of using raw materials (iron and coke), operates on ferrous scrap coming, for example, from the car industry (See Figure 6.3). The scrap is melted down in electric furnaces, and the metal is then either cast into ingot moulds or (through the continuous casting), transformed into billets, blooms and slabs.<sup>9</sup> The semi-products are then transformed into final products through rolling processes.

The minimills technology became very widespread only in the second half of this century. Until the 1930s the traditional method was the only one available and, due to the high investments required, the steel makers were mainly public entities. However, after World War II, dramatic changes in the technology used in electric-furnace steelmaking, such as advances in furnace electrodes, electrode holders and so on, encouraged the scrap-melting producing of carbon steel, which meant that small steel companies could be set up with a relatively small investment. During the 1960s, an initial investment of less than 10.5 billion lira<sup>10</sup> allowed some 50-60 thousands tons of "long products" to be produced annually. The early versions of the minimills

---

<sup>7</sup> Approximately 324 million pounds.

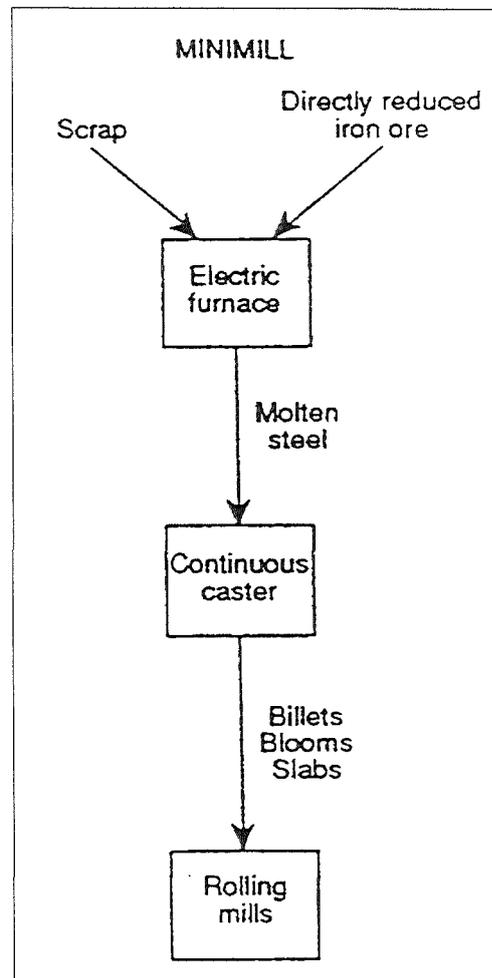
<sup>8</sup> For a comprehensive study of the differences between the traditional method and the minimills one, see Hogan (1987).

<sup>9</sup> Billets are small metal bars. A bloom is a mass of puddle iron hammered or squeezed into a thick bar. A slab is semi-finished steel product that is later rolled into a finished product, such as a sheet.

<sup>10</sup> Approximately 3.5 million pounds sterling.

were initially very successful in the United States and Italy. Soon they spread to other parts of Europe, to Japan, the Middle East, Southeast Asia, and Latin America.

Figure 6.3 Production of steel in a minimill



Source: Harvard Business School, (1991).

The main reasons for their success depended on their high productivity and low costs, which allowed selling “long products” at a much cheaper price than was possible with the fully integrated plants. Between 1960 and 1970, a period of rapid growth of world output of crude steel, the market share of electric-furnace producers grew from 11.0 percent to 14.6 percent.<sup>11</sup> Before the end of the 1970, almost all the

---

<sup>11</sup> Ibid.

production of “long products” was left to the minimills. They progressively extended their product lines to include wires, smooth rounds, special-quality flats, and several other products. During the 1980s, especially due to recurrent crises in the steel market (that did not spare the minimills) and to the limited opportunities for a further growth in the “long products” markets, the users of minimills started pushing for further developments in technology. Their aim was to enter the “flat products”<sup>12</sup> market, which, for a long time was the exclusive dominion of the integrated producers. These technological improvements took place in terms of new processes of continuous casting. They allowed producers to continuously cast “thin” slabs, and therefore to reduce the minimum required scale of the plants. As a consequence the “flat products” market is now open also to the minimills, which are progressively increasing their market share and at the same time, becoming larger and more differentiated. It is still too early to say whether the minimills will have the same success in this sector as they did in the “long products” one, but they certainly represent dangerous competitors for the integrated producers.

In the last 30 years, the steel sector has undergone at least three main crises. This has necessarily had consequences for plant-builders, especially as the main causes of the crises have been excessive productive capacity, and a stable demand. It has been estimated that during 1998 and 1999 the demand for steel plants underwent a reduction of 30%,<sup>13</sup> notably because of the economic problems of the Far East and Russia. In the year 2000, however, the demand for steel plants was buoyant but in 2001 another crisis started hitting the sector.

In 1999 the European plant sector changed significantly. Formerly there were five almost equal competitors, namely the English-Norwegian Kvaerner, the German Schloemann, the German Mannesman Demag, the Austrian Voest Alpine, and the Italian Danieli. The first two were put on the market during the year 1998 and were then bought respectively by Voest Alpine and Mannesman Demag. The Danieli Group, which just 10 years ago ranked more than twentieth on the market for minimills, is now among the three largest producers. Moreover, it is the leader in the “long products” sector.

---

<sup>12</sup> Flat products are any type of flat-rolled steel.

<sup>13</sup> See Il Sole 24 ore, various years.

## 6.3 The characteristics of the sector in terms of *novelty*, *visibility* and *appropriability*

### 6.3.1 The degree of *novelty* of technology and technological change

In the last fifty years, the minimills technology has seen large technological advances: the first electric-arc furnace at the beginning of the century; the introduction of the UHP (Ultra high power, of American origin) and the continuous casting during the 1960s; the great improvements in productivity and quality of the products during the 1970s and 1980s; the increased possibility of differentiating the products and of producing special steels and progressive process automation (CNC). In the last few years, in particular, a new technology has been implemented for the production of “flat products”, which has opened a new large market to the minimills steel makers.

The latest innovation has been introduced by Danieli, which at the beginning of October 2000 inaugurated a new plant for the production of “long products” where the whole process from the metal to the final product can be realised with no interruptions. With this new technology, the production process takes 3 hours instead of the normal 40 days, with a reduction in the cost of 80 lira<sup>14</sup> per each kg which, for an average steel plant, means 40 billion lira<sup>15</sup> in one year. Danieli is also testing the same process for the “flat products” and it should be able to put it on the market by March 2001.

Also the structure of the market has undergone important modifications. Even if there are high barriers to entry, which basically impede the entrance of new firms in the market, in the last few years various mergers and acquisitions have been taking place not only among the major competitors (as mentioned before) but also among the small ones, with an important rebalancing of power. The competition is therefore much stronger than before, and this forces the firms to find clients in distant and frequently unstable countries. Moreover, the frequent crises in the clients’ market, mainly due to over-capacity, make it even more difficult to attempt any sort of forecast for the future. Investments become more risky and finding sources of finance more difficult.

---

<sup>14</sup> Approximately 2.6p.

<sup>15</sup> Approximately 13 million pounds.

The degree of *novelty* is therefore rather high. However, it is not certainly as high as, for example, in the biotech and in the pharmaceuticals sectors, where radical innovations are introduced much more frequently and in a much numerous number.

### 6.3.2 The degree of *visibility*

As explained in Chapter 2, the degree of *visibility* can be studied on the basis of four main variables, namely distance in space, distance in time, ease of evaluation and intensity of expenditure on innovation.

Distance in space refers to the “distance between the people who have direct responsibility for and direct knowledge of the conduct of the processes of innovation and the people who have control over the provision of finance and ultimate power over the firm” (Tylecote, 1999, p.1). In the minimills sector firms tend to have quite a large scale with, therefore, several levels of authority. Moreover, the need for rationalisation and concentration has forced the majority of these firms to acquire subsidiaries abroad, with a further increase in the distance in space.

Distance in time refers to the distance “between the expenditure of money (and time and effort) on innovation, and the point at which its value can be justified (or not) through sales/market share, or profits/cash flow, resulting” (ibid., p.1). According to an expert of the sector,<sup>16</sup> the distance in time (from the first idea to the commercialisation phase) is on average 10 years (therefore quite high) with more time required for radical innovations and less for more simple and incremental ones.

The evaluation of an innovation project is easier, the higher is the investment in fixed capital and the lower are other forms of expenditure, such as those for the marketing of the new product. Data about the distribution of spending for innovation in the minimills sector are not available but they are probably similar to the overall engineering sectors. On average these are characterised by a medium percentage of investment in high *visibility* activities such as fixed capital and R&D and lower in less visible activities such as production. At the same time, even though the importance of patents is increasing, the use of trade secrecy, especially during the innovation process, is still essential.

---

<sup>16</sup> Mr. Poloni, the director of the Danieli R&D center.

For the above reasons we can conclude that also in the minimills sector the degree of visibility is rather low.

### **6.3.3 The degree of *appropriability***

According to the managers interviewed in Danieli and in its subsidiary, Danieli Automation, in the minimills sector patents are an extremely effective means of property protection. At the same time, however, the process of innovation in the minimills sector requires a large element of cumulative learning on the shop floor especially by engineers, technicians and salesmen with their deep knowledge of the market. In addition, there is, on average, a fairly long lag (4-10 years) between the time when the first idea is born and the moment when it is possible to patent the innovation. During this long lapse of time, the use of secrecy is essential. Finally, what is offered to the client can either be a single machine or, more often, a turnkey plant composed of several parts that need to be put together into a functioning unit. In this latter case, close long-term inter-firm relationships with suppliers are essential. For these reasons, despite the effectiveness of patenting, it seems that an *inclusion* of the stakeholders strategy would be the best in this sector unless there were other efficient forms of appropriation.

The characteristics of the minimills sector in terms of novelty, visibility and appropriability appear to be very similar to those of the machine-tool sector. We can therefore now proceed with the study of the Danieli Group.

## **6.4 The Group**

### **6.4.1 The history of the Group**

Danieli is a group of firms. Its history dates back to 1914 when two brothers, Mario and Timo Danieli, founded the Angelini Steelworks in Brescia, Italy, one of the first firms to use the electric-arc furnace. In 1929, part of the firm was transferred to Buttrio where, in a more or less artisan structure, it produced tools for forging steel and small auxiliary rolling machines. During the 1950s, Luigi Danieli, the son of one of the founders, after graduating in engineering, started working for the family

business. At this stage the firm had 55 employees and was quite small. The strategy adopted was to service the needs of the Italian small and medium steel producers, which could not find cheap and automated plants either in Italy or abroad, which were suitable for their scale. The low costs and efficiency of Danieli machines soon became one of the main strengths of the firm.

As early as 1964, Danieli produced the first turnkey plant abroad, in Eastern Germany. Its success continued to increase during the first half of the 1970s, thanks to the predominant importance given to R&D, which allowed it to improve the quality of the products and to realise important innovations. During the 1976-79 period, as a consequence of one of the worst crises of the steel market, the firm underwent a very difficult phase. The dramatic fall in production and orders could have led to its complete crash if a major restructuring had not taken place.

The 1982-86 period witnessed a complete rationalisation of production and a replacement of large parts of the management, which allowed the firm to overcome the crisis. In the meanwhile, the daughter of Ing. Luigi Danieli, Dott. Cecilia Danieli, had started working for the firm. Moreover, Mr. Giampietro Benedetti, the current general director and CEO, who had been working for the firm since 1961, had become the sales director. These two persons together led the firm out of the crisis. The turnover rose from 189 billion lira in 1980 to 813 billion lira in 1990, thanks to obtaining important orders from Ukraine and Byelorussia at the beginning of the 1980s and from the States, the USSR, North Africa and the Far East in the second half of the 1980s. In addition, in 1982, the firm was listed on the stock exchange, the first and only firm in the whole Udine province to put part of its shares on the market. In 1991, Dott. Cecilia Danieli became President and Mr. Benedetti General director of the firm. At this stage the Group had already achieved an international status with several subsidiaries in Italy and abroad such as the Swedish Morgardshammar, specialised in high quality machinery and the Swedish Centro Maskin, specialised in the control of final products.

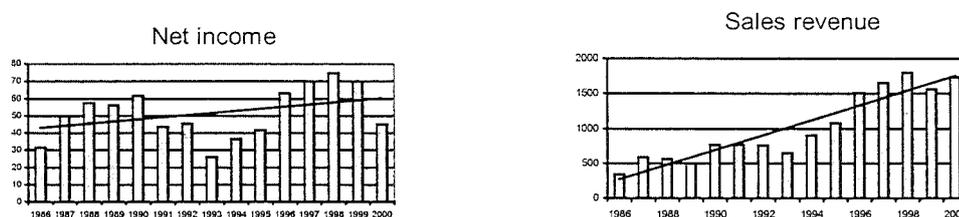
In addition, during the 1990s, four important acquisitions consolidated the Group's international nature and optimised its capacity. The acquisitions of Wean Industries and United Engineering in the US improved the position of the Group in the "flat products" sector, which at the time was dominated by German, English and Japanese plant manufactures. Moreover, the French Rotelec and the Swedish Sund Birsta, acquired in the last few years, are both world wide leaders, the former in the

supply of electromagnetic stirrers and induction heating equipment, and the latter in the design and manufacture of tying machines and finishing equipment.

In 1999 Danieli also entered the integrated plants market, through the joint venture made with Hoogovens Technical Services (Holland) for the production of blast furnaces and associated services. Moreover, in 1999, Danieli has also acquired the patents of the “Arex” direct reduction process, “an innovative technology that improves the efficiency of iron ore reduction. Through this acquisition, Danieli entered the gas direct-reduction market sector with a process aimed at offering plants with lower production costs and less severe depreciation costs.”<sup>17</sup> In 2000 Danieli also acquired Danieli Corus (Holland), the Frojhlng group (Germany) and Davy Distington (UK).

The process of consolidation has produced a progressive growth of the sales revenues and of the net income, as shown by the trend lines in Figure 6.4. It has also allowed the Group to cope better with the cyclicalality of the sector and the recurrent crisis, due mainly to excess of capacity in the steel sector.

Figure 6.4 Danieli Group: Net income and Sales Revenue in billion lira<sup>18</sup>



Source: Danieli’s promotional booklet.

Dott. Cecilia Danieli died in June 1999. As it will be explained thoroughly in the next few sections, this fact has forced a shift from a family run business to some sort of “manager controlled” business. In fact, Mr Benedetti (now unique active majority shareholder) has to rely much more than in the past on the collaboration of managers who are not owners. Such a transformation might have important implications for the process of innovation and the achievement of an appropriate and effective level of expenditure in innovation.

<sup>17</sup> See promotional booklet of the Group.

<sup>18</sup> One billion lira is approximately 330 thousand pounds.

#### 6.4.2 The structure of the Group

As mentioned before, Danieli is a group of firms. The current structure is the result of a long and progressive process of acquisition of different subsidiaries, in Italy and abroad, all specialised in specific phases of the productive process. The Holding owns the majority of the shares in all the subsidiaries, through a financial holding in Luxembourg. In addition, there are two other financial holdings, Danieli International SA (Luxembourg) and Danfin SpA, (Italy), which are responsible for the cash management and the treasury management of the entire Group, respectively.

The Holding is specialised in the engineering of industrial plants and operates as a general contractor for turnkey projects, frequently co-ordinating a large number of subcontractors and making sure that the technological product units interface properly. Nowadays, the Group is amongst the three largest suppliers of equipment for the steel industry and it is the leader in the production of “long product” rolling mills for commercial and speciality steels with a market share of around 65%. In addition, thanks to the acquisition of Wean and United, the Group has now a market share of 30% in the “flat products” sector. The Group, as a whole, is capable of supplying, on a turnkey basis, complete production lines and individual machines or parts thereof. Its activity covers a whole range of products for the steel and non-ferrous metal industries, such as steelmaking plants, hot and cold strip mills, strip processing lines, continuous casting, rolling mills and so on. In addition, Danieli are the leaders in the modernisation and expansion of existing plants.

The Holding is the only firm to be quoted on the stock exchange. The majority of the shares (54.68%)<sup>19</sup> are owned by the “family holding”. An important German competitor owns, apparently only for financial reasons, 15.6% of the shares (since 1980), an Italian insurance company owns 2.364% and another company has 2.211%. The number of equity shares on the market sums up to 21% and the company owns 2.123% of its own shares. In terms of scale, the holding has a strong position within the Group, both in terms of sales and in terms of employees (54%). Currently, the Danieli Group employs more than 3000 people (3,105 on the 30<sup>th</sup> of June 2000). The average age of the employees is 37 years and the educational level is quite high (60% of the employees have taken A-levels and 25% have a degree). The

---

<sup>19</sup> The data refer to August 1999.

average seniority of service is 11 years, which is a bit lower than the Italian average (14).

Danieli exports 98% of its output; 49.4 % goes to Africa and the Middle East, 18.7% goes to the Americas, 9.8% goes to the Far East and 22.1% remains in Europe.

The treasury management of the Italian subsidiaries is realised by the Italian financial holding, which operates as a real in-house bank and manages the internal and external financial operations of each subsidiary.

The management of the liquidity of the Group is realised by the Luxemburgian investment holding, Danieli International SA. This holding was founded a few years ago in the form of “Holding of '29” and as a consequence it enjoys the fiscal advantages of such a juridical form: the incomes of these firms are not liable to taxes and they only have to pay some taxes proportional to their nominal capital. The liquidity of the firm is kept at a very high level to face the periodical downturns in the steel market and to avoid compromising the financial stability of the Group in case one of the clients is late in paying what it is due. The management of the investment portfolio (60% in dollars, 30% in German marks and 10% in ECU) is quite static and it is not subject to the continuous adjustments of an investment trust.

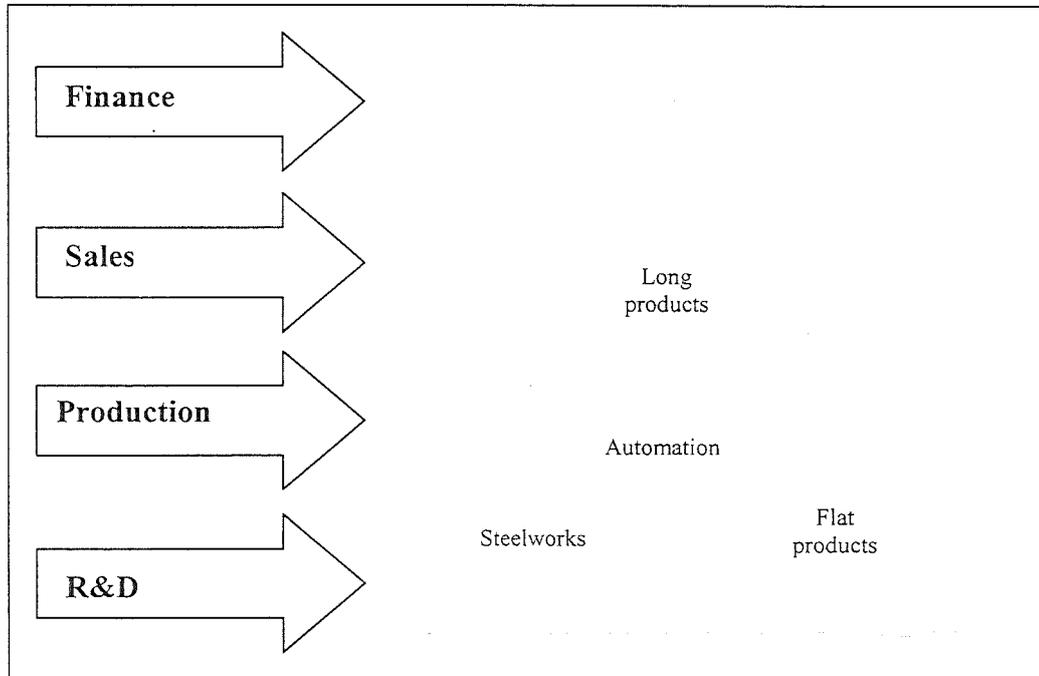
#### **6.4.3 The Holding: Danieli & C. SpA**

The organisational chart of the Holding is illustrated in Figure 6.5. There are four product units, one for the “long products”, one for the “flat products”, one for the steel works and one dedicated to automation. The four functions indicated by the arrows operate horizontally and service the four product units.

Until June 1999, the management of the Holding and Italian subsidiaries was very centralised, the delegation of responsibility to lower levels in the organisation was strongly opposed by the General direction and only two people (Dott. Cecilia Danieli and Mr. Gianpietro Benedetti) took most of the decisions within the Group, both strategic and non-strategic. Recently, however, the death of Dott. Cecilia Danieli, the increasing scale of the Group and the market crisis have made it impossible to postpone the process of decentralisation and rationalisation. The situation is different for the Swedish and for the French subsidiaries which, even if

controlled periodically by the Holding, have quite a high degree of autonomy. (See section on Morgårdshammar for further comments).

Figure 6.5 Internal organisation of the Holding



#### 6.4.3.1 The degree of *appropriability* and *inclusion* of the stakeholders

The strategy adopted by Danieli is definitely an *inclusion* of the stakeholders  
*Employees*

Danieli is a typical Italian firm regarding the relationship with its employees. Employees are *included* in the strategy of the firm and their dismissal is not an option that is usually considered. As mentioned in Chapter 3, entrepreneurs in Italy present a feeling of social responsibility towards the community in which they are in and Danieli is not any different. For example it is quite significant to remember that during the 1945-46 period Ing. Luigi Danieli was vice prefect of Udine, and until 1953 syndic of Buttrio the town where the Holding has its seat. This shows the strong connections that usually exist between Italian entrepreneurs and the community in which they live. A large part of the inhabitants of Buttrio either work

for Danieli or have relatives or friends who do so. In addition, the Group finances several of the community's activities, such as the local volleyball team, the restructuring of ancient buildings dear to the community, and so on.

As a consequence of this symbiotic relationship with the local community, the strategy of the firm is to reach the full employment within the Italian factory, sometimes also at the expense of the foreign subsidiaries. An example of this is the current relationship with the American subsidiaries, Wean and United. In fact the Holding is using their logo to sell products that are produced in Italy and embody the technology invented in the States. For the majority shareholder the final result in terms of profits is the same. However, what is important is to keep the Italian factory working even if this might cause a reduction in the profits of the subsidiaries. An unwanted effect of this strategy is that the employees in the American factories could lose their enthusiasm and not be as efficient as in the past. This possibility was being investigated during August-September 1999 as the likely cause of the American subsidiaries' negative results.

Notwithstanding the employees' *inclusion*, several measures are being adopted to avoid any sort of spillovers. For example, as secrecy is essential in the process of innovation, a very high division of tasks is employed in order to avoid any sort of spillovers to the outside world. Only very few trusty people have the overall knowledge of the innovative projects.

#### *Suppliers and customers*

The suppliers are vital to the process of innovation as most of the output of the Holding consists of turnkey plants composed of different parts which need to be harmonised in a single system. Close long-term relationships with the suppliers are therefore essential. For this reason, in order to avoid any sort of uncertainty, the Group has progressively absorbed most of the strategic suppliers.

The process of integration of the Group has not only progressed upwards along the production chain but also downwards, towards the clients. The Group in fact, through the subsidiary ABS SpA, is also present on the steel market. This steel plant, set a few kilometres from the Holding employs around 500 employees and it is very important for three main reasons. First, it allows the Group to be directly involved in the market for which they are producing and to collect important information about its general needs and necessities. Secondly, it allows the Group to

test the new products so as to present them on the market only when there is a complete guarantee of their correct functioning. Thirdly, the working plants can be shown to new clients, which is much more convincing than complex engineering drawings. ABS is progressively becoming an essential part in the operations of the Group and in 2001 it accounted for one third of the whole turnover of the company.

#### *Other stakeholders*

In the past few years the Group had also shown a much more open attitude towards external research institutes and Italian and foreign universities for example through the funding of PhD students. It is not clear on which basis these forms of collaboration are carried out but they do not seem to be long-term relationships as each time they tackle different and specific programmes.

To conclude, as a result of the difficulties in appropriation characterising the technology in the minimills sector, Danieli appears to have chosen the correct strategy, the *inclusion* of the stakeholders one. In addition, the close long-term relationships with the most strategic suppliers, instead of being based on formal or informal agreements, are based on ownership, a much stronger and long-lasting form of relationship.

#### **6.4.3.2 *Visibility and firm-specific perceptiveness***

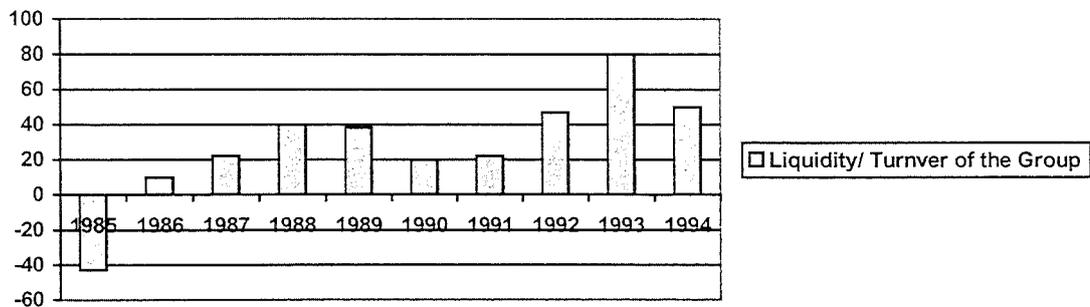
The minimills sector, as much as the machine-tool one, presents a very low degree of *visibility*. Therefore, in order to reach the most appropriate and effective spending on innovation, those who provide the capital for innovative projects in this sector are expected to be closely related to the firm, in a position where there is a sufficient flow of information about the innovative projects. They are also expected to have the skills and the knowledge to evaluate them. In this section we will study how the innovative projects are funded in the Danieli Group, the level of *firm-specific perceptiveness* of those who provide the funds and the type and frequency of the flows of information within the Holding and between the Holding and the subsidiaries.

### *External sources of finance*

Funds used for investment projects can either be external or internal. External funds can either have the form of debt finance or be raised in the form of equity capital in the stock market.

The Danieli Group does not usually make use of banks and other financial institutions in the financing of innovation. This is because the Group has always followed a strategy of self-sufficiency, trying to avoid any sort of interference from the outside. As it can be seen in Figure 6.6, since 1985, the liquidity level has been kept very high, much higher than the average of the other Italian firms. The opportunity costs of this strategy are certainly significant, as the capital could be invested in more profitable activities. However, the high costs connected to the production of every single plant and the subsequent difficulties, in case one of the clients did not pay or was late for one of the instalments, make the choice of keeping such high levels of liquidity quite understandable from the point of view of financial safety.

Figure 6.6 Liquidity ratio



Source: promotional booklet of the Group.

As for the equity capital, even if in the last few years the efficiency and transparency of the Italian capital market have been enormously improved, it is still very difficult, especially for highly innovative firms, to obtain funds. As it was explained in Chapter 3, one way used by Italian firms to overcome these problems has been that of building up pyramids of firms. This mechanism allows firms both to increase the capital available at each level of the pyramid (equity capital) and to transfer funds from the less risky firms that do not suffer from financial constraints to

the more risky ones.<sup>20</sup> Danieli, however, does not take advantage of all the opportunities offered by the group form. In fact, all the subsidiaries are 100% owned by the Holding. The main reason that led the general direction to adopt this form rather than an integrated one is not financial but strategic. The subsidiaries, before being bought, were all very successful in their own field and keeping their identity and logo (in addition to the Danieli one) was essential for their activity. At the same time, the subsidiaries, especially the Italian ones, are too small to be listed on the stock exchange and to be used as instruments for the collection of capital on the market.<sup>21</sup> The only firm to be listed on the stock exchange is the Holding. As mentioned before, 54.68% of the shares are owned by a financial holding Sind International, which is the “Family Holding” and until June 1999 was owned in equal parts by Dott. Cecilia Danieli and Mr. Gianpietro Benedetti. The remaining shares are in part owned by a German competitor, in part by an insurance company and another firm and in part by other minority shareholders.

According to the President, the relationship with the outsider shareholders is very loose. The strategy of the firm is not influenced by the market price of its shares. Danieli’s managers do not perceive any sort of short-term pressure.<sup>22</sup>

#### *The majority shareholders*

The *firm-specific perceptiveness* and technical skills of the majority shareholders, on the other end, are very high. Until June 1999 there were two majority shareholders in the Group, Dott. Cecilia Danieli and Mr Gianpietro Benedetti. Dott. Danieli was the granddaughter of Timo Danieli, the founder of the firm back in 1929. She started working in the family business as financial and administrative manager in 1977, when she was 24 years old. In 1980 she was appointed Managing Director and in 1991, she was appointed Chairman of the Board. Even if she did not have a technical background, (she graduated in

---

<sup>20</sup> In fact, as shown by Zingales (1994) funds raised on the market in the form of equity capital, are not usually used to make tangible investments but employed in financial activities (such as the financing of other firms in the group).

<sup>21</sup> The introduction of the New Market, might bring to the listing of one or more of the subsidiaries but this was never mentioned during the interviews.

<sup>22</sup> “Shareholders may put short-term pressures on management. To the extent that shareholders lack or do not understand information relevant to the longer-term performance of companies – e.g. on technological progress ‘in the pipeline’ they will respond excessively to current profit, dividend announcements, earnings per share, and similar easily available financial data based on historical performance or other short-term performance measures” (Demirag, 1996, p.128). This argument therefore does not apply to the case of Danieli.

Economics) she had a good understanding of the technical issues involved in the processes of innovation thanks to her long experience within the firm. Mr. Benedetti, who first started as a designer for the firm, became Group Sales Director in 1977. In 1980 he was given the added responsibility of managing the Engineering Departments and in 1991 he was appointed CEO of the Danieli Group. His understanding of the technical issues is therefore very deep and his strategic importance within the Group is quite clear given his past career. In fact, it is quite unusual in an Italian family business that 50% of the controlling shares are transferred to a non family member, unless this person plays a crucial role in the managing of the firm. These two people together managed the Group in the last 20 years, taking most of the decisions, crucial and non-crucial and brought the firm to its current successful status.

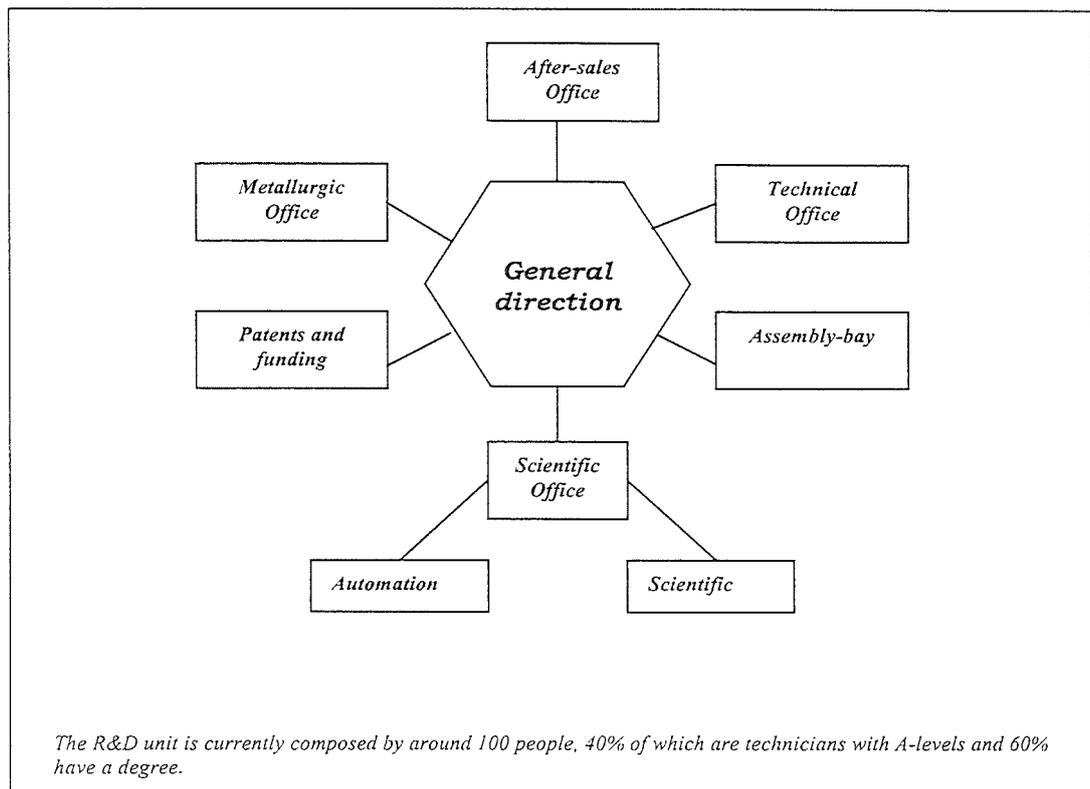
The involvement of the majority shareholders in the management of the firm is however insufficient to solve all the problems connected with the low level of *visibility* of the innovation activity. In fact, factors such as hierarchical distance, cultural distance and distance in space, can further reduce the level of *visibility* which is typical of an industry. Moreover, internal management control systems and reward systems can put short-term pressures on the management and impede the achievement of the appropriate level of investment in innovation. To address these issues, we will consider the process of innovation through all of its phases from the production of the first idea to the commercialisation of the final product.

#### *The process of innovation*

The first input for an innovative project within the Holding is usually provided by the salesmen as they have the best perception of the main needs of the steel producers and of the activities of the competitors.

Sometimes, an innovative idea can also be born inside the firm, generally by the R&D employees. Also the employees of the product units can generate some innovative ideas. This, however, does not happen very often since, as admitted by the general manager of the “long products” unit, they do not have much time left to think about innovations. In general the radical innovations are made within the R&D unit (See Figure 6.7) whereas the production units mainly generate more incremental innovations.

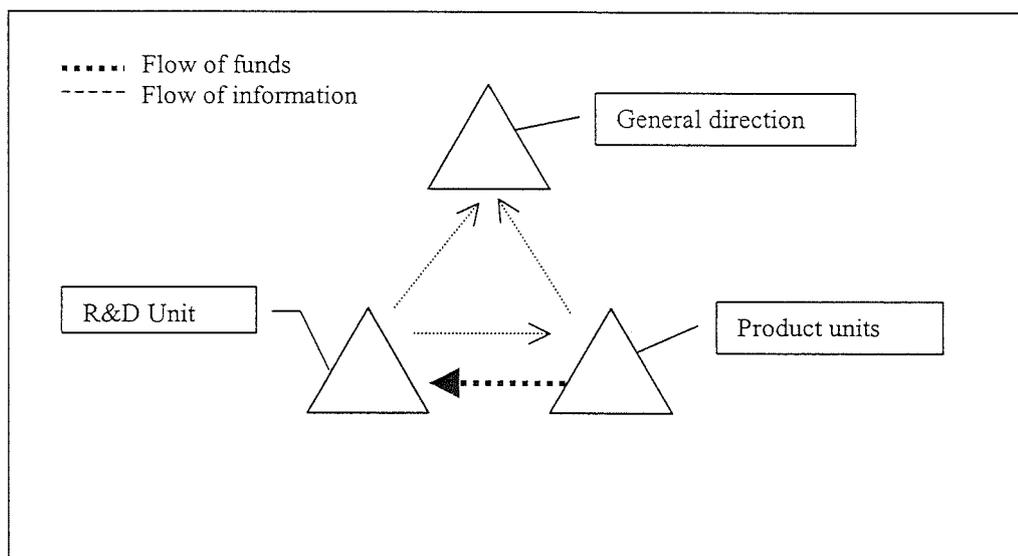
Figure 6.7 The R&D unit



The scientific office starts with the study of the innovative project from scratch. Generally the R&D unit works together with specialised associations, Italian and foreign universities. When there is a general understanding of the issues arising from the innovative idea, the R&D director has a meeting with the product manager, a sales manager and sometimes with the majority shareholder and the vice-general manager to discuss the many aspects of the project, its feasibility, its timing and its profitability. In the same meeting, if the project is accepted, the tasks and the deadlines are decided for each person responsible. After the first prototype is realised the industrialisation phase starts. The latter comprises a long series of activities such as the marketing of the product and technical courses for the salesmen and design engineers. Finally the new machine is built under the supervision of the R&D employees. Some parts of the machine can also be realised by the R&D laboratory itself. The overall process usually takes between 4 to 10 years.

The R&D expenditures and the first set up of the new machine are totally financed by the firm or in collaboration with public institutes (IMI and MITI),<sup>23</sup> which usually provide 20% of the total cost. All the product units (long, flat, steel-making or automation) are responsible for the financing of their own innovative projects. They are encouraged by the General direction to invest a fixed percentage (5%) of their sales in R&D and within that sum of money their autonomy is quite high. The R&D unit, therefore, operates as a contractor for each product unit and it is responsible to these for the success of the projects. The R&D unit is not a profit centre and its results are not evaluated on a profit basis. Within each project the employees are controlled on the basis of the degree of achievement of their goals such as the fulfilment of deadlines or the number of mistakes and so on. Every month the R&D unit is required to send a report to the product units on the state of the innovative projects. A similar report is also sent annually to the General direction, with a list of the current projects and their state (See Figure 6.8).

Figure 6.8 Flows of information and funds



<sup>23</sup> Within the R&D unit there is an office that is concerned with the obtainment of public funding and the preparation of the necessary documentation to patent an innovation. This office works both for the holding and for the subsidiaries. Around 20% of R&D expenditures are financed through public loans with low interest rates coming from IMI, MITI and regional authorities (See also Section 3.2.7). The Group does not make any use of financing from the European Union as the information required is too specific and could be easily used by the competitors. In fact, whereas Italian public organisations ask mainly for the kind of technology that is being used (for ex. magnetic fields), the European Union requires all the calculations and the results. According to an expert interviewed in the R&D unit, the *industry-specific expertise* of those who work for Italian public organisations is very high and the Group does not usually have problems in obtaining financing when the project is valuable.

On the contrary, the product units and each subsidiary, are profit centres and once a year they are required to prepare a forecast budget for the general direction. The general direction, after making the necessary adjustments on the basis of all the forecast budgets, sends the budget back to the product units and the subsidiaries. In addition, every month the product units and the subsidiaries prepare a profit and loss balance sheet that reveals the level of the operative revenue. Their performance is evaluated on the basis of various indices:

1. Minimum contribution to the overall structural costs of the firm;
2. Minimum net value;
3. State of each order (timing), number of orders acquired, number of orders completed;
4. Economic evaluation of each order (efficiency indicator);
5. Financial evaluation (payments by clients and expenditures): this is very important as there can be fluctuations of billions of lira;
6. Structural costs;
7. Qualitative parameters: for example quality of the engineering drawings (number of modifications etc.).

Once a month the Board of Directors meets to discuss the profit and loss balance sheets. The Board consists of the general manager of the product unit that is being evaluated, the majority shareholder, the general managers of each function, the prime contractor and the sales middle managers.

The previous considerations suggest that within the Holding, the distance in space is very low. The offices of those who “have direct responsibility for and direct knowledge of the conduct of the process of innovation, and the people who have control over the provision of finance and/or ultimate power over the firm” (Tylecote, 1999, p.1) are less than 400 metres apart. The R&D unit has its seat in a building just across the street from the Headquarters. Moreover, the R&D activity is very centralised as the R&D unit performs innovative activities not only for the Holding but in large part also for the Italian subsidiaries and in small part for the foreign ones. Meetings among the people in charge of the various sections are held every month but informal conversations especially between the product units and the R&D unit take place much more frequently, weekly or even daily. The level of interfunctional

interaction between production and R&D can therefore be considered as high. This is very important in an industry like the minimills one where accumulation of knowledge on the shop floor is central to successful innovation. In addition, even if the R&D unit basically works for the product units, there is no hierarchical and cultural distance between the various managers. In fact, they all occupy the first level of the hierarchy (considering the majority shareholder as level zero) and the R&D manager until a few years ago was the “long products” manager.

#### *The visibility of the subsidiaries*

All the Italian subsidiaries work on different types of machines and processes. They all have their own market and usually sell part of their products to the Holding and part on the market. Most of the subsidiaries have their own R&D laboratory and carry on a part of their own processes of innovation. Also the subsidiaries, just like the product units, are supposed to attempt to spend an amount equal to 5% of their sales in R&D. They usually use internal funds. When there is a need for extra funds, the subsidiaries turn to the Holding, which will use the liquidity available on the internal capital market. In addition, as mentioned before, in the R&D unit of the Holding there is an office dedicated to the obtaining of financing for innovation under special conditions. Moreover, when the subsidiary produces an innovation for the Holding, the latter contributes 50% to the overall expenditures.

The subsidiaries are quite autonomous in their innovation decisions but they have to follow specific indications given by the Holding, such as limiting the innovations to the steel sector and not producing anything that already exists. Every subsidiary is required to produce at least one innovation per year. Different innovations, however, require different lengths of time and the annual goal is not as strict if the subsidiary is carrying on very radical types of innovations. As usual, for every departure from the rule, it is possible to discuss the issue with the General direction, to explain the situation and to establish different goals. This is possible because the General direction understands the technical issues connected with the process of innovation and does not evaluate the subsidiaries only on the basis of financial indicators.<sup>24</sup> The General director of the subsidiary we interviewed declared that the firm does not feel any sort of short-term pressure and that the goals that the

---

<sup>24</sup> Also the subsidiaries are required to present a forecast budget every year and a profit and losses balance sheet every month.

Direction imposes are not difficult to achieve. For example, in 1998 Danieli Automation introduced two innovations without achieving the percentage of 5% of sales in the R&D expenditure.

The situation is different for the foreign subsidiaries not only due to the distance in space but also to the fact that several of them use a different technology. As a consequence the *visibility* of the processes of innovation of these firms to the Holding appears to be quite low, and there appears to be a serious danger of insufficient flow of information. The Holding receives the monthly report as from any other subsidiary and until now, the profit-goals have always been achieved. For this reason, the General direction has not felt the need to interfere in the management of the subsidiaries. However, it is possible that short-term pressures are put on the subsidiaries by the Holding, as the former is in a way acting as an outsider, even though with a very strong *industry-specific expertise*.

#### 6.4.3.3 The degree of *novelty*

As it was mentioned in one of the first sections, the degree of *novelty* in this sector is medium and has had a tendency to increase. This is both because of the most recent developments in the technology and of the strong turbulence of the market. Firms need to be more innovative and effective than ever before and in many cases they need to start important processes of rationalisation. This is even truer for the Danieli Group, given the recent events.

The conservativeness of the employees, who have been working for the firm for decades, might represent an obstacle and slow down any attempt of rationalisation. Their high level of *inclusion*, which is very important for *appropriability* reasons, might be counterproductive in a situation like this. The danger is slightly reduced by the fact that the rationalisation process embodies a high degree of delegation of the responsibilities and this will be mostly welcomed rather than hindered. At the same time, however, the increase also in the responsibilities of only one or few people might cause harmful effects if this is perceived as discrimination. The management will have to pay a great deal of attention to the rationalisation process in order to obtain the most effective result.

The firm tends to finance its own R&D and not to rely on financial institutions, because of their scarce *industry-specific expertise*. At the same time,

however, public forms of financing, coming mainly from IMI, MITI and regional authorities, account for 20% of the total expenditure in R&D.

## **6.5 One of the foreign subsidiaries: Morgårdshammar**

### **6.5.1 The Company and its history**

Morgårdshammar is a group of firms within the Danieli Group. Its history dates back to 1856 when the firm, which was previously producing iron, turned to the production of rolling mills for “long products”. Thanks to the invention by Ernst von Zweigbergk of the first universal rolling mill for the production of flat iron with sharp edges and close tolerances, made during the 1870s, Morgårdshammar soon became soon the leader in the Nordic countries, selling products both locally and abroad. During the 1950s, the firm consolidated its positions thanks to the introduction of patented products (roller guides, housing-less roll stands with cylindrical roller bearings and convertible stands), which represented a great improvement in the rolling mill technology as a whole.

Since its set up and until 1975, the firm, which soon became a group of firms with subsidiaries abroad and a wide net of agents, was privately owned. The owners not only sat in the Board of Directors but were also active in the management of the firm. In 1975, the trading company Beijerinvest, which few years later merged with Volvo, bought Morgårdshammar. In 1987, Volvo sold Morgårdshammar to the Danieli Group, one of the main competitors of the firm. The fear that Danieli had bought the firm just to shut it down was widely felt among the employees but this was obviously not in Danieli’s plans. After an important process of rationalisation and a few attempts to find a suitable strategy to manage the relationship (direct competition and geographical subdivision of the market), the two firms seem now to have found a solution. Currently Danieli produces rolling mills and Morgårdshammar focuses mainly on the manufacturing and delivering of revamps of rolling mills, guides (40% of the market) and spare parts.

Today Morgårdshammar’s shares are 100% owned by Danieli & C., Officine Meccaniche SpA through a financial holding in Luxembourg. In turn, Morgårdshammar has five totally owned subsidiaries (factories or sales offices), in

India, Sweden, USA, Spain and Germany. There are 221 employees (1998/1999) in the parent company and 292 in the overall Group. This latter figure accounts for 9.7% of the employees of the Danieli Group. In 1999, the net profits of the Morgårdshammar Group amounted to 39,893 kSEK,<sup>25</sup> which accounted for 15.9% of the net profits of the entire Danieli Group. More than half of the backlog of the Morgårdshammar Group (394,000 kSEK) comes from Europe, a large part (around 37%) from the States and a smaller part (around 12%) from the Far East.

The study of Morgårdshammar within this thesis is important for several reasons. Firstly, we can investigate the effects of factors such as geographical distance, cultural distance and decentralisation of R&D activities on the process of innovation. Secondly, we can analyse the relationship between the headquarters, the Italian subsidiaries and the foreign ones. Thirdly, as Morgårdshammar has undergone three main changes of ownership in the last 25 years, we can investigate what effect on innovation owners with a different degree of *firm-specific perceptiveness* and *industry-specific expertise* have. Finally, as Morgårdshammar is a Swedish firm, we can also analyse how the corporate governance of different countries influences the innovation process of two firms belonging to the same sector and group.

### 6.5.2 The process of innovation

In Morgårdshammar also, the process of innovation usually starts as a result of the request of a customer who expresses a particular need. The firm, in fact, has focused its production on the revamping of old plants and on the production of guides and therefore mainly in the improvement of existing products. A close collaboration between the sales department and R&D is therefore essential. In Morgårdshammar this is ensured by the so-called “product council”, which comprises the head of the sales department, representatives of the production unit and R&D department, and also the CEO. This council is in charge of evaluating the feasibility of each project in technological terms and its expected future profitability. Within the council there is a direct and immediate transfer of information between the three areas aforementioned and the general direction. The presence of the CEO, in particular, ensures that once a project is approved within the council it will also be approved when the forecast budget is presented. The product council meets once a

---

<sup>25</sup> 1 KSEK=0.066 pound sterling.

month but as the firm is quite a limited in size and has a very well developed intranet system, when a problem arises it can be discussed almost in real time.

Before starting work on any specific part of the project, the firm always checks whether those parts are already in production within the rest of the Group and in particular at the head quarters. In that case, thanks to the exploitable synergies of a group of firms, the firm can spare time and energy and buy those parts from the Group.

#### ***6.5.2.1 Firm-specific perceptiveness and industry-specific expertise***

In the case of Morgårdshammar, the financing of innovation usually involves both internal and external (mainly from banks) sources of funds.

With regards to the internal sources, problems can arise at two levels. In fact, on the one hand there can be problems of internal *visibility* and, on the other, there could be problems in the relationship with the shareholders.

As for the first issue, those who are in charge of approving the budget and the extraordinary expenditures could not receive precise and complete information about the process of innovation. They might not also have the technical specific background for evaluating the project and for understanding its value. In the worst case, the projects are evaluated only on the basis of financial ratios, calculated monthly or quarterly. This practice usually causes serious problems of short-term pressures on those who are involved in the process of innovation and generally it impedes the achievement of the “appropriate” and most effective level of expenditure.

In the case of Morgårdshammar, these kinds of issues do not seem to be a problem. The CEO, Mr. Almhed, who is in charge of approving the budget and the extraordinary expenditures, has a technical background and, as mentioned before, is part of the product council, where all the decisions about the new projects are taken. In addition, the rather democratic atmosphere within the firm and the low importance given by Swedish people to time-consuming formalities, ensure that at each hierarchical level there is a relaxed and informal flow of information, top-down and bottom-up.

As for the relationship with the shareholders, when the visibility is low, they are required to have a high *firm-specific perceptiveness* or, at least, a high degree of

*industry-specific expertise*. The different owners of Morgårdshammar have not always had such qualities and over the years the economic results of the firm illustrate this.

Until 1975 Morgårdshammar was a family owned business, with a portion of the owners directly involved in the management of the firm. Therefore, the degree of *firm-specific perceptiveness* and *industry-specific expertise* of the owners must have been very high and this certainly contributed to the high level of innovativeness of the firm during the 1940-75 period. In 1975, the firm was bought by Beijerinvest, a trading company with no expertise whatsoever of the sector. In that year the “black period” of the company started. Beijerinvest sold a large part of the physical capital of the firm and paid no attention to its low profitability and low efficiency. During this period the investments in innovation were very high but not very efficient and the firm frequently ended up with losses. The situation did not change when Beijerinvest became part of the multinational Volvo. In fact, not only did Volvo not have any expertise of the sector (the ownership of Morgårdshammar was just an undesired result of the agreement with Beijerinvest) but also it did not even try to solve the problems that the firm was facing. This was probably due to the limited size of Morgårdshammar in comparison to the overall scale of the Volvo Group. The firm at this point was definitely oversized and not at all efficient, with very high costs and consequent losses.

In 1987 Volvo sold the firm to Danieli & C. SpA. Danieli, before buying Morgårdshammar, required a radical reduction of the personnel from Volvo, which was basically halved in a very short period before the acquisition. Further important reductions occurred during the first half of the 1990s, and more limited ones in the last few years. The profitability of the Morgårdshammar Group has progressively increased since 1987, with an improvement of 50% in the net worth since 1994.

Therefore, the acquisition by Danieli has proved to be essential to the survival and return to profitability of the Morgårdshammar Group. In contrast to the previous owners, Danieli is different in its very high degree of *industry-specific expertise* (Danieli was a competitor of Morgårdshammar) and in its high interest in the success of the Morgårdshammar Group, as this is of strategic importance for its success too. The level of *firm-specific perceptiveness* was rather low initially but now it is increasing. In fact, even if Danieli knew Morgårdshammar since the 1950s to be a dangerous competitor, producer of highly innovative products and of absolute

quality, the degree of mismanagement during the 12 years before the acquisition was quite clear from the balance sheets. As a consequence, it is quite reasonable that during the first few years Danieli controlled the firm very strictly. There were independent consultants spending a lot of time within the firm, checking on everything, and most of the decisions were taken by the headquarters. The situation changed progressively as Danieli became more familiar with the management of Morgårdshammar, developing personal contacts and therefore a higher *firm-specific perceptiveness*.

This process took quite a long time for several reasons. First, in the beginning Danieli was seen as suspect by Morgårdshammar as there was fear that Danieli had bought it just to shut it down. Second, in the first 8 to 10 years, a few wrong strategies in the management of the relationship between the two firms (direct competition, subdivision of the markets in geographical areas) kept the levels of suspicion quite high. Third, there are several cultural differences that are difficult to overcome. For example in Sweden, the management of firms tends to be very democratic with a high delegation of responsibility and a continuous flow of information top-down and bottom-up. On the contrary, as mentioned before, within Danieli most of the decisions, even not relevant ones, were/are taken by the owners. This difference caused two main problems. On the one hand the management of Morgårdshammar felt that the control was excessive and not justified. On the other hand they also felt that the communications with the headquarters were slowed down.

At present, in describing the relationship with the subsidiaries, the headquarters claim that the foreign ones (including Morgårdshammar) have almost total independence. They are mainly evaluated on the basis of their ability to generate profits and as long as they prove to be profitable there is not much interference in the management of the firm. The headquarters still require to be regularly updated, both through monthly budgets (which are thoroughly checked in terms of the reliability of the calculations) and through regular meetings (every two months) and phone calls. On the other hand, the management of Morgårdshammar, recognizes that the degree of substantial control is now lower than before (even if the formal one is still quite high) and that the current situation resembles the typical democratic Swedish style of management much more so than in the past.

An interesting issue, however, came up during the interviews. The fact that Danieli has always adopted a strategy of low cost is renowned in the market and it is a strategy that is applied not only within Danieli & C. SpA, but also within the subsidiaries. For Morgårdshammar this has meant among other things a strong reduction in the personnel and a tendency to minimize on everything. One direct consequence of such cuts has been that the product unit cannot give feedback to the R&D and design units at a very early stage of the process of innovation but only when the engineering drawings are completed. Occasionally the drawings have to be sent back because of mistakes, and this leads to inefficient delays. If the product unit had more resources to spend, some of such resources could be used to keep closer and more frequent contacts with the R&D and design units. In this way early mistakes could be identified and corrected in real time. Moreover, as the engineering sectors are characterised by a strong cumulative learning on the shop floor, those who are involved in the actual production could provide very useful information and suggestions at a much earlier stage.

This issue was not considered a problem in the interviews with Danieli or with its Italian subsidiary. The reasons could be twofold. First, factors such as geographical distance, decentralisation of the R&D laboratories, and probably hierarchical distance might be reducing the *visibility* between the Holding and the subsidiary and impede the achievement of the “appropriate” spending in innovation in Sweden. On the other hand, there might be a difference in the perception of the importance of such feedbacks which could be due to cultural differences, to agency problems (it is well known that managers are always willing to enlarge their departments) or to the fact that the Swedish subsidiary is one step ahead of the Holding in the adoption of the integrative management approach.

Other sources of funding come from the local bank with which Morgårdshammar has been working for decades.<sup>26</sup> As the firm has mainly focused its activities on the revamping of old plants, the funds are mostly provided for specific projects and not for research in general. In particular, the firm usually advances the capital needed (half with internal funds and half with bank loans) for any project and the clients pay in instalments only when the project is finished. In this respect a very

---

<sup>26</sup> In Sweden the relationship between banks and firms is much closer than in Italy and it resembles the German type.

important role is played by the insurance company Sace, which offers rather strong guarantees to the bank for the repayment of the loans. Within the insurance company there is an employee who always follows the activity of the firm and therefore knows it very well. This, in a way, gives a competitive advantage to Morgårdshammar over foreign competitors, especially the Italian ones. In fact, in Italy insurance companies hardly ever offer guarantees of this type as they lack any sort of *industry-specific expertise* necessary to evaluate the risk level of the projects. Quite often Danieli & C. SpA asks for help from Morgårdshammar in order to get the same sort of guarantees from the Swedish Sace. The firm therefore does not appear to suffer any sort of financial constraint due to the low *visibility* of its activities, thanks to its long-term relationships with external financial entities.

In contrast with Italy, however, Morgårdshammar has serious difficulties in obtaining public funding for innovation, as the Swedish authorities tend to finance firms that do not have the necessary liquidity to realise processes of innovation. Morgårdshammar has been very profitable in the last decade and this presents a serious obstacle for the obtainment of subsidies. In addition, Swedish authorities would require very precise information about the results of the project they have funded, which is in contrast to the secrecy requirements of the technology utilised in this sector.

To conclude, apart from a certain level of short-term pressure imposed by the headquarters and by the lack of public funding in Morgårdshammar, there does not seem to be any important factor that should impede the achievement of the most effective and appropriate level of spending on innovation. This is because those who provide the funds for investment projects have the possibility and capability of correctly monitoring the progress. In fact, the requirements in terms of *firm-specific perceptiveness* and *industry-specific expertise* imposed by the low *visibility* of the process of innovation typical in most of the engineering sectors seem to be held both by the owners and also by the bank and insurance company.

#### **6.5.2.2 “Inclusion of the stakeholders” or “Shareholders first” strategy?**

In Morgårdshammar, the level of *inclusion* of the stakeholders is definitely high with regards to customers and employees, whereas it is basically non-existent

with regards to the suppliers. The role of the customers' needs as first inputs in most of the processes of innovation has already been mentioned before. A close collaboration with them is therefore essential for the firm and must be strongly persecuted. In the promotional booklet of Morgårdshammar it is stated:

“In accordance with the traditions of our company, we do not only supply equipment but also develop lasting relationships with our customers. A part from the fact that it is very satisfying to make friends with people of various nationalities, these relationships lay the foundation for the confidence a customer can place in a reliable supplier. The customer knows that he is always welcome to contact Morgårdshammar for assistance in order to solve problems or to discuss further plans for his plant. Our experienced technicians are at his service. On our part, it is important that we have the possibility to follow-up the functioning of delivered equipment and to learn from the experience of the customer. This information is essential for our future development towards refined and even more efficient equipment.”

This extract offers a good idea of the attitude of the firm towards its clients and of the importance given to a close long-term relationship with them. The salesmen of Morgårdshammar further strengthen such relationships. In fact, several of them have been working in this field since the 1960s and as a consequence they know their clients very well. Moreover, thanks to their wealth of experience, not only are they able to sell products but also to offer a service of problem solving. They first sell a technical solution and then decide about the price. In other words, the customers know that when asking for advice they will receive a professional answer. Many of Morgårdshammar's competitors, on the contrary, employ very young salesmen who do not have long-term experience and base their activity on the availability of numerous brochures. This keeps the relationship on a very formal and distant level. In addition, the assistance given to the customer by Morgårdshammar continues even after the warranty period has expired and in general at no extra charge.

This attitude towards the customers is quite widespread in Sweden. As explained in the Appendix 4, there is a strong tradition in Sweden of “engineering inventiveness oriented towards problem solving in dialogue with qualified industrial

customers” (Adolfsson et al, 1999, p.35). Firms tend to specialise in niches and to satisfy specific customers’ needs. This appears even more obvious when taking into consideration companies such the ASEA and Ericsson, which cooperate very closely with the public authorities in order to find the best solutions to specific problems.

The employees are another group of stakeholders that in Sweden present a very high level of *inclusion*. In fact, as much as in Germany, labour unions are very powerful and the employees have the right to have one of their representatives sitting on the Board of Directors. The same is true for Morgårdshammar, where, however, the attitude of the general direction towards the employees is much more similar to the Anglo-Saxon than to the German or Italian ones. In fact, in Italy and Germany, managers (who are often owners) tend not to dismiss their employees both because they feel some sort of social responsibility towards the community in which the firm is inserted and because of the law on labour protection. In the Anglo-Saxon business world, on the contrary, managers frequently consider dismissing even large parts of the workforce if this would allow an increase in profits. Also in Morgårdshammar, the general management would consider adopting this strategy if were considered profitable. At the same time, however, in contrast with the Anglo-Saxon case, in Sweden unions frequently try to oppose such decisions even though usually with a constructive attitude.

Morgårdshammar also adopts specific forms of incentive for those who work in the factory. The incentive scheme invites the employees who have an idea on how to improve a product or a process, to submit such ideas to an evaluating team. If the idea is found good and if it allows the firm to get some sort economic benefit, the employee will receive a percentage of that benefit. This mechanism seems to work quite well and in a span of time of 12 months or so, the firm usually grants between 25 and 50 awards.

Morgårdshammar does not adopt a strategy of *inclusion* of the suppliers. In fact, even though the firm buys at least 60% of the components for its final product from external suppliers, the main strategic parts are produced internally in order to avoid problems of spillovers. This is because none of the suppliers produce exclusively for the firm and it would be very dangerous to produce strategic components outside the local workshop. As in the case of Stam, there does not seem

to be forms of *inclusion* that would represent a sufficient incentive for the suppliers to avoid the spillovers to the competitors of Morgårdshammar.

Quite an important role in the process of innovation is played by universities and research centres. On many occasions Morgårdshammar needs external help to solve specific technical problems and these public bodies appear to have the necessary expertise to deal with such problems. The relationship is however not a close long-term one and Morgårdshammar pays for services when they are needed, not on a regular basis.

## 6.6 Recent changes and conclusions

In the last ten years the structure of the Danieli Group has changed considerably. It has grown larger, with a much higher number of employees and subsidiaries, both in Italy and abroad and a much wider spectrum of products offered. It is now a very complex and articulated business. At the same time, the market is also undergoing deep changes with a progressive concentration from five to three main producers and with the expectation of a further reduction to two in the next few years.<sup>27</sup>

As mentioned before, this is a market characterised by a low level of *visibility*, a low level of *appropriability* and a medium level of *novelty*. According to the framework, this means that those who provide the capital for innovation should have a high level of *firm-specific perceptiveness* and a medium level of *industry-specific expertise* and that there should be an *inclusion* of the stakeholders, namely employees, suppliers and customers. Danieli appears to have satisfied most of such requirements. In fact, the Group has responded very well to the problems arising from a low degree of *visibility* of the sector and the low *firm-specific perceptiveness* and *industry-specific expertise* of Italian banks and financial institutions and the low efficiency of the capital markets. It has opted for a very high concentration of ownership and control in the hands of active shareholders with technical expertise. It has understood the importance of an efficient and frequent flow of information top-down and bottom-up (within the Holding and with the Italian subsidiaries) fostering formal and informal meetings. In addition, it has managed to rely considerably on capital coming from government bodies with a high level of *industry-specific*

---

<sup>27</sup> Interview with Mr. Benedetti in *Realtà industriale* (Sept. 1999).

*expertise*. Some resources are channelled to the interfunctional interaction among the Production, R&D and Sales units, which is essential given the high specialisation and complexity of the products. However, the interaction between the Production and R&D units appears to be limited to the higher hierarchical levels whereas feedbacks coming from the shop floor are not institutionally encouraged and usually do not occur. This is in line with the Fordist organisational approach that characterised the Holding, which tends to minimise the influence of human variability upon the performance of the production system, and in general limits the opportunities for incremental product and process innovation. An integrative model seems to fit better with the high technology era the sector is now in. As mentioned before the Swedish subsidiary<sup>28</sup> has already set up some sort of “suggestions box” which, even though still very far from a Japanese model, appeared to work very effectively.

As for the relationship with the foreign subsidiary, problems of geographical and hierarchical distance and short-term pressures could further reduce the level of *visibility* characterising the sector. This relationship is perceived in a slightly different way by the General direction in Italy and by the employees in Sweden. In fact, on the one hand the General direction argues that the subsidiaries are mainly evaluated on the basis of financial indicators (which is quite dangerous as this could pose short-term pressures on the subsidiary and therefore limit the amount of funds spent on innovation) and are granted a large degree of autonomy. On the other hand, the Swedish subsidiary perceives that the degree of autonomy, which was very low in the first few years after the acquisition, is still lower than what is usual in Sweden, where the delegation of responsibilities is generally very high. This is a clear example of the cultural differences between Italy and Sweden. Drawing on Hofstede's (1991) work, Italy is characterised by a much larger tolerance of power distance<sup>29</sup> (80) and of uncertainty avoidance<sup>30</sup> (80) than Sweden (respectively 15 and 32).

---

<sup>28</sup> Empirical evidence shows that consultative principles of management are progressively diffusing in Sweden (Allan Næs Gjerding, 1992).

<sup>29</sup> Power distance is “the extent to which less powerful members of institutions and organisations accept that power is distributed unequally”. See Hofstede G. and Bond M. (1984, p.419).

<sup>30</sup> “Countries characterised by high uncertainty avoidance have a great deal of structuring of organisational activities, more written rules, less risk-taking by managers, lower labour turnover, and less ambitious employees. Low uncertainty avoidance societies have organisation settings with less structuring of activities, fewer written rules, more risk-taking by managers, higher labour turnover, and more ambitious employees. The organisation encourages personnel to use their own initiative and assume responsibility for their actions”. See Hodgetts R.M. and Luthans F. (1997, p.103).

With regard to the low level of *appropriability* characterising the industry and the importance of cumulative learning on the shop floor, the Group has adopted an *inclusion* of the stakeholders strategy, with a great importance given to employees and close long-term relationships with customers. As for suppliers, already mentioned in the case of Stam, it appears that secrecy makes any form of *inclusion*, with the exception of acquisition, ineffective.

At this stage, however, it is also necessary to pay attention to the current transformations that the Group is undergoing and to the effects that such changes could have. In fact, the progressive internationalisation of the Group, its expansion in scale, the widening of the product range offered and the death of Dott. Danieli, have made it impossible for Mr. Benedetti to keep managing and monitoring the Group as personally and thoroughly as before. As a consequence, in 1999 a deep process of rationalisation was started within the Group. This consisted on a progressive delegation of responsibility to newly appointed middle managers and a multiplication of the hierarchical levels. The distance in space has progressively increased along with the process of internationalisation. The hierarchical distance will progressively rise, the flows of information are likely to slow down and there will probably be much more reliance on financial indicators than in the past. This could be a real danger for the Group as it could resolve into a progressively lower level of *visibility* for the shareholder and into an insufficient level of expenditure in innovation. The rationalisation process was necessary but a particular attention was to be devoted to keeping a high level of internal *visibility*.

One of the first effects of this new situation and of the expected reduction in the possibility of exercising a frequent and personal control over the employees has been the adoption of a new incentive plan.

Until 1998 the reward system for the product units' employees consisted of a bonus based on the effort and achievements plus a rise in salary of a percentage as high as the level of inflation. This system has been transformed in 1999. Since then the salary of the first four levels (until the head clerk) have consisted of a fixed part plus a percentage of the profits of the firm, which are paid either in cash or in stock options. At the breakeven point the variable part is zero and it progressively increases with the profits of the firm. The 5<sup>th</sup> and 6<sup>th</sup> levels receive a fixed salary plus, when deserved, a special reward. The problem with this system is that most of the times profit is not synonymous with innovation. In fact, even though the General

Direction requires the product lines and the subsidiaries to spend a fixed percentage of their sales in R&D, there are many other expenditures deriving from a process of innovation that might undergo a consistent reduction in order to increase the short-term profits, and that might undermine the process of innovation itself. In fact, if those who have the power (therefore the higher levels in the hierarchy) use their insider knowledge and pursue the long-term goals of the Group, there should not be problems. However, if they have a short-term perspective, even if they are insiders, they might prefer to reduce some expenditure necessary for innovation, in order to produce higher profits.

To conclude, even though the technology employed in this sector presents a very low level of *visibility*, which would advise the firm being of limited scale, the high technology involved in the final plants, their size and characteristics have led to a progressive widening of the firms and concentration in the market. The majority shareholders in Danieli have tried for a long time to keep a very tight and direct control over the firm. However, the complexity of the business has now made it materially impossible, forcing a reengineering of the Group. Even if such delegation of responsibility might reduce the *visibility* for those who provide the funds for innovation, at the same time it will allow a faster decision-making process and maybe a progressive shift towards the integrative model.

## **7. Corporate governance and product innovation in the machine-tool sector in Italy**

### **7.1 Introduction**

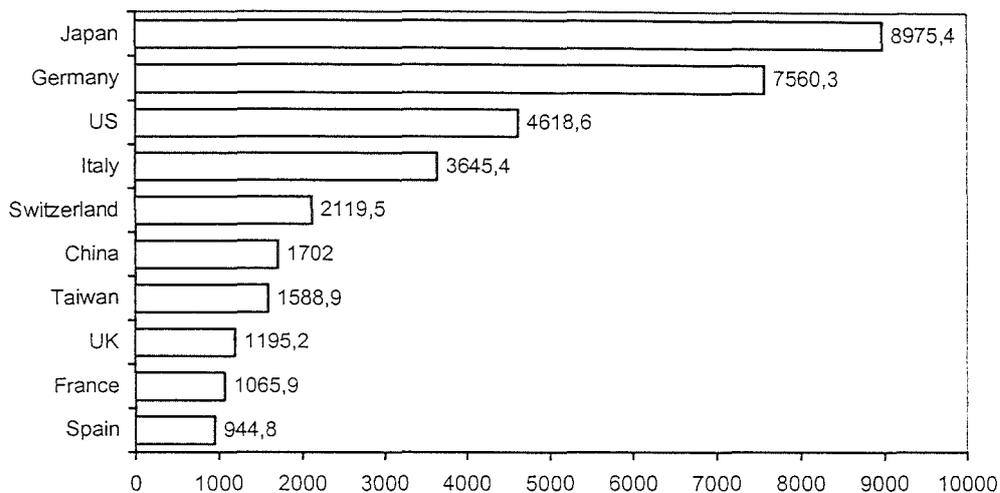
In Chapter 4 we have presented the main characteristics of the machine-tool sector, the most important actors in the innovation process, and the main requirements in terms of *firm-specific perceptiveness*, *industry-specific expertise* and *inclusion* of the stakeholders. We have also tried to explain, through Tylecote's (1999) framework, the decline of the US machine-tool sector and the upsurge of the Japanese one. In Chapter 5 and in Chapter 6 we have presented two illustrative case studies. These have helped us to gain a better understanding of the influence of Corporate Governance on product innovation.

In this chapter, we will focus on the Italian machine-tool sector. We will present its history, its evolution and its current situation. We will make also a comparison between the requirements in terms of corporate governance indicated by the framework for this sector and its current characteristics. To do this we will use several sources. Firstly we will report data collected and elaborated by UCIMU (Italian association of machine-tool builders, robot and automation). Secondly we will refer to the Mediocredito database for the years 1992-93-94, to the CIS database and to the results of the COPI survey. Finally, we will report the existing literature on the topic and the results of interviews with managers and experts in the sector.

### **7.2 The machine-tool sector: the historical background**

As indicated in Figure 7.1, in 1998, Italy was the fourth international machine-tool producer (9.8%), after Japan (23%), Germany (20.4%) and the US (12.4%), with an output valued at US \$3,645 million and an increase of 5.8% over the production of 1997.

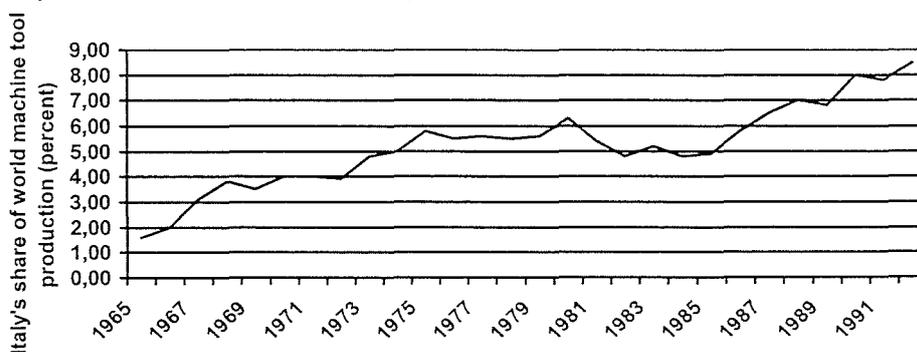
Figure 7.1 Top ten machine-tool manufacturing countries in 1998 (million US dollars)



Source: UCIMU (1998).

Like Japan, Italy is a relatively newcomer among the top producers in this sector. In fact, even if it possesses a rather long tradition in the manufacturing of machine-tools, until a few decades ago it held only a very marginal position. As can be seen in Figure 7.2, until the beginning of the 1970s Italy's share of world machine-tool production was lower than 4%.

Figure 7.2 Italy's share of world machine-tool production



Source: CTI II (1994).

According to CTI II (1994), the history of the Italian machine-tool sector can be divided into four main phases: an early stage (1960-70) of high growth; a second stage (1970-80) of the industry's internationalisation; a period of crisis (1980-85), which involved the whole sector and a period of recovery (1985-91). We can now

add other two phases, namely the crisis that involved the whole sector between 1992 and 1994, and the current recovery period.

During the first phase, several exogenous factors favoured a rapid growth of the sector: firstly, at least until the middle of the 1960s, an exceptional growth in gross national product and private consumption, which boosted demand; secondly, the geographic proximity of machine-tool producers to those small and medium sized firms that played an essential role in Italy's industrialisation process; thirdly, the geographic proximity to the large producers such as Fiat, Alfa Romeo and Lancia in the Northwest and Zanussi (producer of electrical household appliances) in the Northeast;<sup>1</sup> fourthly, the process of substitution of labour<sup>2</sup> with capital (mainly machine-tools), especially after the introduction in 1965 of the famous Sabatini Law (No. 1329), which granted subsidies and financial aid for the purchase of new machinery.

In the following decade, the first oil shock led most industrialised countries to find more productive and efficient means of production and this increased the demand for high technology machine-tools. As a consequence, even though the internal growth rate of demand was not as large as in the previous phase,<sup>3</sup> Italian producers managed to increase their sales thanks to the exports growth. As mentioned in Chapter 5, during this decade the world market share of Japanese producers progressively enlarged, mainly at the expense of the American one. Italian producers, instead, did not suffer much from the Japanese competition thanks to the high customisation of their products, which is still one of their main strengths.

As mentioned in Chapter 4, the machine-tool sector is characterised by periodical crises and the 1980-85 period represented one of the worst crises of the last 50 years. Italy, however, was not hit as hard as its main competitors, mainly the US and Germany.

---

<sup>1</sup> These large firms created a large network of suppliers of parts and components, natural users of machine-tools.

<sup>2</sup> Which was becoming progressively more expensive.

<sup>3</sup> Fixed investments both in small and large firms declined significantly after 1972, and the "apparent consumption" in real terms of machine-tools between 1972 and 1978 is negative.

According to CTI (1994) this was mainly due to three factors: the ability of Italian firms to increase their exports to those markets that grew more rapidly;<sup>4</sup> the fact, already mentioned, that Italy was not much affected by Japanese competition; the fact that Italian machine-tool producers (as opposed to the American ones) were very quick to introduce the CNC technology. In 1976, when the introduction of CNCs had just started, the share of CNCs in total Italian machine-tool production was already 15.2%, a percentage as high as the Japanese one, nearly twice as high as the British, 50% higher than the German, and 25% higher than the French one. Since then, Italian producers have kept investing in this new technology and were surpassed only by their German and Japanese competitors.

Even if Italy was not strongly hit by the 1980-85 period of crisis, it recovered at a much slower pace than its main competitors. According to CTI II (1994) this was the effect of a progressive “erosion of both price and non-price advantages” (p.78).

**Table 7.1 Competitiveness indicator of the Italian machine-tool industry (1980=100 Italian lira)\***

	US	Japan	Germany	UK	France	Average	Change (%)
1980	100.0	100.0	100.0	100.0	100.0	100.0	-
1981	78.9	81.8	101.9	93.4	100.1	87.7	-12.3
1982	70.7	86.9	98.6	95.5	102.1	87.6	-0.1
1983	64.8	77.2	93.7	97.0	100.7	80.9	-7.6
1984	56.8	68.5	90.5	91.3	98.3	74.2	-8.3
1985	57.0	69.6	92.4	87.4	99.4	75.0	1.1
1986	76.9	73.7	89.8	101.5	99.7	81.6	8.8
1987	89.9	80.1	85.2	105.0	100.4	85.1	4.3
1988	89.2	72.1	86.3	94.9	99.6	81.2	-4.6
1989	84.4	68.8	86.2	94.2	101.0	86.9	7.0
1990	96.1	84.4	85.3	98.5	99.2	92.7	6.7

\*The indicator is the index of the ratio between wholesale prices of Italian machine-tools and the wholesale prices in the indicated countries, using the exchange rates of 1980. The decrease of the indicator means an increase in competitive advantage of the Italian industry, and vice versa.

Source: CTI II (1994).

As shown in Table 7.1 in the second half of the 1980s, the price advantages of Italian machine-tool producers on average progressively diminished (with the exception of 1988). In addition, the competition of the Asian countries, mainly Taiwan, became progressively stronger especially due to the very low prices of their machines and the Italian imports from these countries increased progressively.<sup>5</sup>

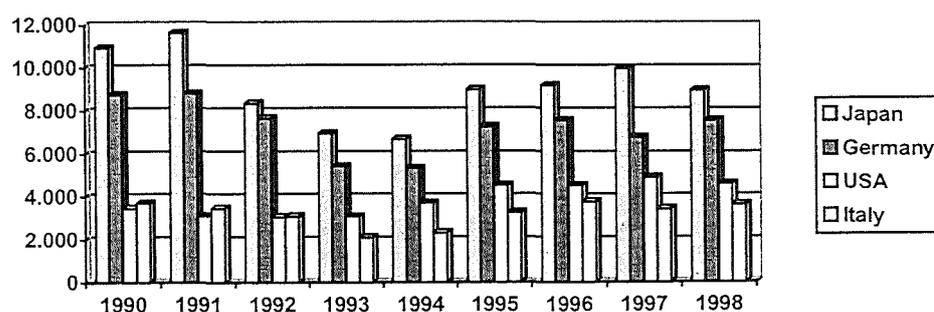
<sup>4</sup> Italy expanded its export/production ratio from 49.1 percent in 1980 to 63.4 percent in 1985. See CTI II (1994).

<sup>5</sup> As reported by CTI II (1994), in 1991 the unit value (per kilogram) of Italy's imports from Taiwan was less than half the price of Italian exports. See CTI II (1994).

As for the non-price advantages, at the beginning of the 1990s, new countries (mainly Asian countries) appeared on the scene as serious competitors. These countries, until the end of the 1980s, did not present a significant threat to Italian machine-tool builders due to their focus on standardised machines. However, thanks to the use of CNCs, new software and modular adds-on, they are now able to produce standardised and therefore cheap machines capable of offering very similar services to the highly customised ones. In addition, many countries have also started to compete on the same grounds as the Italian producers, “and are often able to erode market shares of Italian manufacturers in this field” (CTI II, 1994, p.80). At the same time, according to the CTI study, Italian manufacturers did not respond to this new threat adequately and even they reduced their fixed capital investment activity.

In the last few months of 1991 a new crisis started hitting the sector (see Figure 7.3). In 1992, for the first time in 10 years, the production of machine-tools in Italy decreased with respect to the previous year, by as much as 500 billion lira.<sup>6</sup> Export levels dropped by 5.2%. In less than four years around 14% of the firms had to close down and employment was reduced by 4,000 persons. The crisis ended only in 1994, year during which the index of orders increased by 30.7%. The sector is now following the upturn of the cycle.

**Figure 7.3 Production of machine-tools for the four world main producers (million of US dollars)**



Source: UCIMU (1999).

<sup>6</sup> Approximately 170 million pounds.

### 7.3 Structure of the industry and corporate governance system

As we have discussed in Chapter 4 for Japan and the US, we will now explore the system of corporate governance (in the wide sense) of the Italian machine-tool sector. We will compare our findings with the requirements indicated by the theoretical framework that we are utilising. To do this we will use the Mediocredito database, the CIS database, the results of the COPI survey, data provided by UCIMU (the Italian association of machine-tool builders) and recent literature on the topic.

It is worth mentioning again that the technology utilised in the machine-tool sector is characterised by a rather low degree of *visibility*, a low degree of *appropriability* and a medium degree of *novelty* (with sporadic peaks due to the adoption by machine-tool producers of innovations coming from other sectors, mainly electronics).<sup>7</sup> According to the theoretical framework, a technology of this kind requires a high degree of *firm-specific perceptiveness* of those who provide the funds for innovation, and is better if compounded with a medium degree of *industry-specific expertise*, and a high degree of *inclusion* of the stakeholders, which comprise mainly customers, suppliers and employees.

#### 7.3.1 Internal Visibility

Several points need to be considered with respect to *internal visibility*. Geographic and hierarchical distances, distance in space, and the number of R&D laboratories are all factors that influence the flow of information, from where the innovation takes place, to the highest levels in the organisation where the decisions of investment are taken.

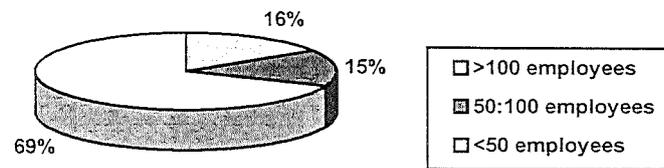
##### *Scale*

The 450 Italian machine-tool firms are, on average, small and medium in scale. In 1997, of the top 25 European firms, only one was Italian and only 6 Italian firms ranked among the top 50 (33 were German). As shown in Figure 7.4, 69% of the firms employed less than 50 persons, 15% had 50 to 100 employees and only 16% of them had more than 100 employees.

---

<sup>7</sup> See Section 4.4.

Figure 7.4 Italian machine-tool industry: breakdown by employee groups. 1997



Source: UCIMU (1999).

In turnover terms, almost half of the firms had less than 5 billion lira,<sup>8</sup> 37.8% of them fell in the 5 to 25 billion lira range and only 6.2% reached 50 billion lira.

As a consequence of this, the distance in space should be, on average, quite limited, and the frequency of face-to-face meetings, which are some of the best means for facilitating the flow of information, should be quite high. The same is true for the hierarchical distance, as small-medium sized firms do not usually have many ranks of authority that could impede a smooth and fast transmission of information. Finally, the number of R&D labs in each firm is hardly ever higher than one.

The Italian machine-tool sector also comprises some large firms and some firms that belong to groups of firms. These account for more than 50% of the total production of the sector. The *visibility* within these firms, if not appropriately dealt with, could be much lower. In fact, as we have seen in the case of the US (see Chapter 4, Section 4.5), firms belonging to large organisations are often subject to short-term pressure and are often forced to cut expenses for innovation in order to increase profits. In fact, Sciberras and Payne (1985) found that an Italian firm belonging to an electronic engineering group “has been starved of necessary investment funds [...] The lack of commitment by the parent has exacerbated its current poor competitive performance, which in turn discourages the parent from approving investment in new equipment needed for the machine-tool firm’s future generations of products” (p.117).

---

<sup>8</sup> 1 billion lira corresponds to approximately 330 thousand pounds sterling.

### *Structure of ownership*

As for the structure of ownership we will refer to the Mediocredito database.<sup>9</sup> Most of the firms in the sample are family-owned businesses with a strong concentration of ownership. On average, the first shareholder owns 59.0% of the shares, the second shareholder 25.0% and the third 16.0% (See Table 7.2).

**Table 7.2 Percentage share of the first three shareholders**

<b>First shareholder</b>	59.0%
<b>Second shareholder</b>	25.0%
<b>Third shareholder</b>	16.0%

Source: Mediocredito database.

In 11.4% of the cases firms are totally owned by a single shareholder (individual or firm) who also has direct control over the firm. When there is more than one shareholder, in most cases (63.9%) there are family links among all the shareholders, in 10.7% the family links are only among a few of them and in 25.4% of the cases there are not any family links (See Table 7.3).

**Table 7.3 Existence of family links among the first three shareholders (when there is more than one shareholder)**

<b>Among all of them</b>	63.9%
<b>Among few of them</b>	10.7%
<b>No family links</b>	25.4%

Source: Mediocredito database.

In addition, in 73% of the cases the first and major shareholder is a private person living in Italy, in 11.4% of the cases another industrial firm, in 8.1% of the cases it is a financial holding and in 4.1% of the cases it is a bank or some other financial institution. Finally in 3.3% of the cases a foreign individual or firm is the major shareholder (See Table 7.4).

---

<sup>9</sup> For a description of the Mediocredito database see Chapter 2.

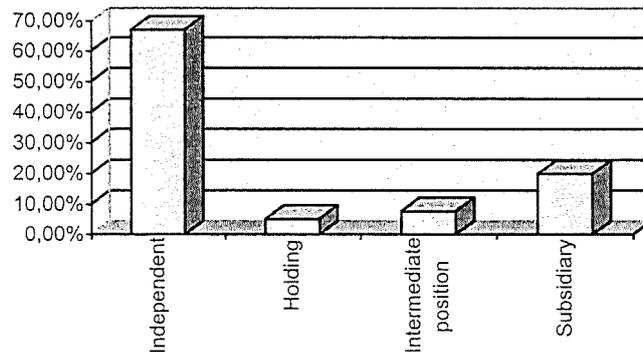
Table 7.4 Type of majority shareholder

Private person living in Italy	73%
Another industrial firm	11.4%
Financial holding	8.1%
Bank or other financial institution	4.1%
Private individual living abroad	3.3%

Source: Mediocredito database.

As much as 32.8% of the firms belong to group of firms, 60.5% of these are a subsidiary, 23.7% are in an intermediate position and 15.8% exist as holdings (See Figure 7.5).

Figure 7.5 Distribution of firms among independent firms and groups of firms



Source: Mediocredito database.

Such a high concentration of ownership and activism of the majority shareholders should account for a high *firm-specific perceptiveness*. It also suggests that these individuals are interested in the survival of the firm in the long-term, if need be at the expense of low short-run profits.

In small-medium sized family businesses, the owners frequently perform important tasks, other than the administrative ones, and often act as salesmen. Salesmen, as explained in Chapter 5, are some of the most strategic sources of innovation in this sector, and are usually involved in new product development from the first idea to delivery to the customer. The owners, therefore, are usually completely aware of the appropriateness of any expenditure. Again, the presence of other industrial firms and financial institutions as majority shareholders could present

a problem. In fact, if these entities are highly diversified, those in charge of evaluating investment projects or the performance of profit centres might not have good industry expertise in the machine-tool sector and could try to evaluate the performance of the subsidiaries in a less effective manner, mainly on the basis of financial indicators. As shown in the case study of Danieli (Chapter 6), belonging to a large group such as Volvo was not sufficient for the success of Morgårdshammar, as the Headquarters' understanding of the steel sector was too limited to correctly monitor the activity of the firm. Only with the advent of Danieli, which operates in the same sector, has the firm been able to regain its efficiency.

### 7.3.2 *Visibility towards the outside*

Given the above considerations, we can argue that if a firm has sufficient internal funds to finance the innovation process, there should not be problems in reaching the "appropriate" and most effective spending on innovation. The internal visibility of firms appears, in fact, to be very high.

Table 7.5 Forms of financing innovation 1992-1994

	N	Min.	Max.	Mean	Std. Deviation
Risk capital	72	0	0	0	0
Self-financing	72	0	100	74.68	38.75
Medium-long-term loan	72	0	100	6.18	20.37
Medium-long-term loan at a lower than the market interest rate	72	0	100	14.10	30.14
Public funds lent without security	72	0	50	2.26	8.08
Fiscal deductions	72	0	100	1.39	11.79
Other	72	0	80	1.39	9.69

Source: Mediocredito database.

However, when internal funds are not sufficient to finance innovative expenditures, Italian machine-tool builders could encounter a few problems.

Italian entrepreneurs prefer not to sell the shares of their firms on the market to collect extra funds and therefore they need to rely on other sources (see Table 7.5). Bank loans account only for 6,18% of the overall financing. This is because banks and other financial institutions do not have the required level of *firm-specific perceptiveness* and *industry-specific expertise* to cope with the low visibility of this sector. As shown in Table 7.6, they appear to have a very low understanding of the machine-tool sector. On a 7 point Likert scale, the degree of understanding by banks

of the machine-tool was ranked at 2.3 with a very small standard deviation. As explained in Chapter 3, this is because, apart from local banks within industrial districts and Mediobanca, they have never had any incentives to invest in sector or firm-specific human capital, and, as a consequence, they have never played any role in the corporate governance of Italian firms.

**Table 7.6 Degree of understanding of the machine-tool sector by Italian banks**

	N	Min.	Max.	Mean	Std. Deviation
1=null, 7=complete	18	1	4	2.333	0.9075

Source: COPI survey.

In 1993 in an interview with “Il Sole24 ore”, the Italian equivalent of the Financial Times, the President of UCIMU, Flavio Radice strongly criticised the banking system for not supporting Italian industrial firms. “They seem to have forgotten their real mission [...] In such a difficult situation firms are left alone. Many of them had to turn down orders because they did not have sufficient banking warranties. Our German and French competitors, on the contrary, can rely on lower interest rates and on a much more professional relationship between banks and firms. [...] The first goal is to convince the banking system to address their efforts towards the most strategic sectors in the country, the high-tech ones”.<sup>10</sup>

In the same interview, the director of the newspaper, Gianni Locatelli, claimed that the relationship between banks and firms will change only when the banks will try to seriously understand the problems of the firms. He said: “there is a need to grow again a number of good branch directors who, overcoming the bureaucratic approach, are able to build a constructive relationship with firms, especially the small ones”.<sup>11</sup>

As shown also by the CIS data, in Italy the lack of appropriate sources of finance as one of the factors hampering innovation, is a much more serious problem than in any other European country, except for Spain (see Table 7.7).

---

<sup>10</sup> Il Sole 24 ore (30/06/1993).

<sup>11</sup> In 1993 most of the firms in the sector were paying an interest rate of 16-17%. See Il Sole 24 ore (2/07/93).

Table 7.7 Ranking of the “lack of appropriate sources of finance” as a factor hampering innovation (1=most important)

Country	Ranking
Norway	6
Portugal	3
Netherlands	7
Luxemburg	3
Italy	2
Ireland	3
Spain	2
Germany	3
Denmark	4
Belgium	5

Source: summary table of CIS database. Own calculations.

In Chapter 3, we argued that only within industrial districts, do banks appear to have played an important role in the corporate governance of Italian firms. More than 50% of Italian machine-tool builders are located in the Lombardia region and this could suggest the existence of an industrial district. This, in turn, would mean that one or more banks should have the *firm-specific perceptiveness* or at least the *industry-specific expertise* to finance machine-tool firms in this sector. However, even if the number of machine-tool firms in Lombardia is very high, it is not possible to consider this area as an industrial district.

A typical industrial district is the chair producing district of Friuli,<sup>12</sup> for example. In not more that 100 square km, around 1000 firms coexist, producing some or all the parts of a chair, amounting to 40 % of the chairs produced in the whole world. A bank has its headquarters at the centre of the district, in a town of not more than 4000 inhabitants. Even though the firms in the district do not exclusively use this bank, it certainly has a very large number of these 1000 firms among its clients and shareholders. Very recently, the bank, together with some of the largest firms in the district, has set up a business for the provision of network services to the other firms in the district. The service will not only provide real-time flows of information between suppliers and industrial customers but it will also allow the

---

<sup>12</sup> The most eastern region in Italy.

bank to monitor the overall activity of the district, the relationship between firms and the operations of each single firm.<sup>13</sup>

We now turn to the machine-tool sector. In Italy, it has around 450 firms, most of which are concentrated in the North and in particular Lombardia, where one can find around 50% of total plants. But Lombardia is not like Friuli and even if most of the firms are located around Milan, they have a very large number of banks from which to choose. In addition, as revealed by the CTI analysis, “the areas with a high concentration of machine-tool suppliers and a high machine-tool adoption rate, are however characterised by (1) a low degree of sectoral specialisation, with machine-tool suppliers coexisting with a large number of manufacturers from different sectors and of all sizes, often playing a key role as machine-tool users; (2) the presence of a few leading companies with a high international visibility, such as Comau, Dea, and Prima in the Turin area, and Mandelli and Marposs in Emilia; (3) a large majority of smaller manufacturers of machine-tools and accessories, acting either as subcontractors for larger manufacturers or as specialised suppliers of small and large users located within and outside the area; (4) no public intervention at a local level that is specific to the machine-tool industry, and a high geographic concentration (in Lombardia) of services provided by UCIMU.”<sup>14</sup> It is very unlikely, therefore that the degree of *firm-specific perceptiveness* and *industry-specific expertise* of banks in this area is as high as in a real industrial district.

As for forms of public financing of innovation, Table 7.5 shows that they account for only 17.75% of the total expenditure in R&D (medium-long term loans at a lower than the market interest rate, public funds lent without security and fiscal deductions). Alfredo Mariotti, General Director of UCIMU, during an interview with *Il Sole 24 Ore*<sup>15</sup> confirmed that public instruments for financing are not lacking. However, he claims, either firms do not know of them, or they are too difficult to understand. Between 1990 and 1995 only 43 firms out of a total of 450 used public forms of financing for innovation and in 1995 only 13 were active in projects financed by the European Commission.

---

<sup>13</sup> From interviews with the main directors in the bank.

<sup>14</sup> CTI II (1994).

<sup>15</sup> *Il Sole 24 Ore* (7/3/1995).

According to the CIS database, among the various laws in favour of innovation, the Sabatini law, which provides financial support and credit incentives for the adoption of innovative machinery, appears to be the most used one (23.5%), followed by the Applied research fund (19.18%), and by law 317.9 (10.36%) in favour of R&D activities among small firms. The other forms of support of innovation (European funding, indirect financial funding, R&D services, technical-scientific consultancy, public orders of R&D, public orders for the supply of products) are all considered unimportant, both by the average of Italian firms and by the machine-tool sector.

There are no data available to explain the specific reasons that do make public instruments very ineffective. In fact the causes could be multiple, such as: a difficulty in getting information about the available forms of financing; a lack of resources within SMEs to assist in filling the required documents; a long time spent by the public administration in evaluating the application forms; a high number of applications rejected either due to strict limits, or to actual scarce innovativeness of the projects, or to scarce *industry-specific expertise* of those who evaluate the projects.

The above considerations allow us to draw some important conclusions about the Italian machine-tool sector. On the one hand, it appears that internal *visibility* is on average very high. Therefore, if there are internal funds available, firms should be able to reach the appropriate and most effective spending on innovation. On the other hand, when internal sources of finance are not sufficient, machine-tool firms appear to have some difficulties in obtaining the necessary funds. In fact, banks and other financial institutions do not have the necessary *firm-specific perceptiveness* and *industry-specific expertise* to correctly evaluate the innovative investment projects. Also, applying for and obtaining public sources of finance appears to be rather difficult, especially for SMEs.

As there are no good short-term prospects of obtaining strong support from the banking system and from the public sector, UCIMU has launched a campaign to convince Italian SMEs to merge or become part of groups. According to UCIMU's

experts,<sup>16</sup> Italian machine-tool producers need to increase their scale, as in the globalised market only a larger scale allows firms to meet the required marketing expenses and to finance important innovative projects.

We do not agree with UCIMU as we think that firms should maintain their small and flexible scale.<sup>17</sup> To overcome the lack of financial resources they need to learn to operate together, not only for marketing activities,<sup>18</sup> but also for R&D, at least at the very early stage of research when there are no problems of competition. In addition, it is important that firms collaborate to ensure the compatibility of the various parts they produce,<sup>19</sup> as nowadays customers demand more integrated systems, rather than single machines.

A successful example, which should be followed by many others, is that of LAMBDA,<sup>20</sup> a complete line for the production of pots. This scheme was realised thanks to co-operation of 14 firms, each of which provided its own technology. Within one year from the production of LAMBDA, the consortium of firms received four other orders for the production of similar lines.

However, according to the Mediocredito database, only 5% of the firms between 1992 and 1994 carried out R&D activities with other firms. The agreements took place among firms with 51 to 250 employees and with more than 500 employees. Among the first group, the percentage financed was around 50% whereas in the second group it was much lower (15%). As confirmed by the President of Stam, firms in the machine-tool sector are not used to cooperating with their competitors.

A critical activity in favouring the setting up of inter-firm agreements could be played by UCIMU. The association currently comprises 70% of the firms in the

---

<sup>16</sup> This idea has been put forward by UCIMU since 1993 in an interview with Il Sole 24 ore (24/08/93). See also: Il Sole 24 Ore (3/07/98), Il Sole 24 Ore (23/07/98), Il Sole 24 Ore (18/12/98). More recently, it has been confirmed by Dott. Battaglia, director of the economic studies of UCIMU, during a personal interview in December 1999. In 1998 UCIMU had also produced a law project that would favour mergers among small-medium firms. For a different opinion see Il Sole 24 Ore (22/08/95).

<sup>17</sup> For an exhaustive discussion of this point see Section 7.4.

<sup>18</sup> In 1992, ten firms set up a consortium (Ita) for the penetration in the North American market. Besides the headquarters, there are now several distributors covering the whole territory. The goal is to reach 20 associates. The structure is financed both by the associated firms and by the government through the law that finances consortia of firms aimed at penetrating foreign markets. See *Tecnologie meccaniche* (1996d).

<sup>19</sup> See Il Sole 25 Ore (22/8/1995). These kind of agreements among firms are strongly favoured by the EC.

<sup>20</sup> See Il Sole 24 Ore (21/9/1993).

machine-tool sector, being in this way the natural point of focus and coordination among them. The association was formed in 1945 “to defend members’ interests by encouraging greater and more widespread business enterprise through services that are constantly revised to meet the needs of firms in the industry”.<sup>21</sup> UCIMU is articulated in several subsidiaries to provide specialist support in all areas of business: EFIM, the unit that organises trade exhibitions in Lombardia; Fondazione UCIMU, an institution for the realisation of sectoral-specific analyses; CEU SpA, a company that organises trade exhibitions in Italy and abroad and Probest Service SpA, which offers several types of services, from training courses for new employees, to courses for the re-training and re-qualification of old employees, mainly in the firms’ premises. The engineering section offers services in support of innovation, such as feasibility analyses; engineering activities (basic design, layout of the shop floor of the client etc); supervision on the assembly; setting up of a new machine or plant; selection of the customer’s personnel and technical/managerial training for the use of new machines. Finally, Probest offers advice and operational support to better deal with all the matters concerning the sale and purchase of capital goods and project financing applied to technological innovation. Unfortunately it appears that only the firms situated in Lombardia get considerable benefits from UCIMU, whereas the other firms, even those belonging to the association, do not receive much in exchange for the high fee they are paying.<sup>22</sup>

### ***7.3.3 Appropriability and inclusion of the stakeholders***

As explained in Chapter 4, the degree of *appropriability* in this sector is rather low and as a consequence the *inclusion* of the main stakeholders, mainly customers, suppliers (especially those who produce CNCs) and employees, is very important.

On average it appears that firms in the machine-tool sector tend to be more prone to use an *inclusion of the stakeholders strategy* as opposed to a *shareholders first strategy*. Table 7.8 shows that on average, those firms that participated in the COPI survey try to balance the interests of the shareholders with those of the other

---

<sup>21</sup> See: [www.UCIMU.it](http://www.UCIMU.it).

<sup>22</sup> See Stam case study (Chapter 5).

stakeholders. Notwithstanding the shift towards the outsider position, the importance given to the stakeholders appears to have increased in the last few years. The results are however not statistically significant.

**Table 7.8 Is your main priority to maximise shareholders' value, if necessary at the expense of the interests of other stakeholders?**

	N	Min.	Max.	Mean	Std. Deviation
Now	15	1	7	3.53	2.19
5 years ago	16	1	7	3.75	2.13

1= We always insist on balancing the interests of the shareholders with those of other stakeholders.

7= We give complete priority to shareholders' interests.

Source: COPI survey.

As evident in Table 7.9, the Italian machine-tool producers usually have a very strong relationship with the first group of stakeholders, namely the customers.

**Table 7.9 Type of relationship with the customers**

	N	Min.	Max.	Mean	Std. Deviation
Long-term=1 Short-term=7	18	1	3	1.8	0.7859
Tight=1 Loose=7	18	1	4	2.055	0.9376

Source: COPI survey.

Italian machine-tool builders, in fact, mainly produce highly customised products and as a consequence they need to operate closely with their customers. It is not a coincidence that most of the Italian customers of machine-tools are in the North of Italy where most of the builders are also situated. At the same time, in exchange for highly customized products, built to satisfy their specific requirements, customers are usually willing to make payments up-front. These are very important, as small machine-tool builders could not afford to finance the production of such expensive machinery on their own. In the last few years, in particular, the standards set by the customers have become progressively higher, requiring not only high levels of automation, but also a large degree of flexibility and easy re-configuration. For these reasons, machine-tool producers have now a new role, not only being suppliers of a

specific machine, but also ideal partners for the re-engineering of the means of production.<sup>23</sup>

The degree of vertical disintegration in Italy is very high, with large reliance being placed on very specialized suppliers. The machine-tool builders, in fact, rather than making non-proprietary components such as tool-changers or electrical cabinets, buy these from the suppliers who specialize in them. Serving several builders enables the suppliers to make components in economical lot quantities, which lowers the unit cost to the builders. As a result, the builders have more resources to devote to application solutions within each company's market niche.<sup>24</sup>

**Table 7.10 Type of relationship with the suppliers (not of CNC)**

	N	Min.	Max.	Mean	Std. Deviation
Long-term=1 Short-term=7	18	1	5	2.833	0.9376
Tight=1 Loose=7	18	2	6	3.8	1.27

Source: COPI survey.

The relationship with the suppliers (not of CNCs) appears to be long-term but suppliers do not seem to be strongly *included* (see Table 7.10). In fact, for reasons of secrecy, most of the products bought by the machine-tool builders from the suppliers are standard ones or produced on the basis of drawings provided by the machine-tool builders themselves. In this latter case, the supplier only has knowledge of a small part of the whole project, which is of no use to the competitors. Machine-tool builders do not appear to finance projects of innovation from their suppliers or to work together with the supplier for the development of an innovation.

As for the suppliers of CNCs, things have changed considerably in the last decade or so. In fact, up until the early 1990s, most Italian machine-tool manufacturers tended to purchase CNC technology on the market. They favoured internationally manufactured devices (Siemens or FANUC, as a rule). Only a few of them, such as Mandelli, Jobs and Dea, produced their own CNCs both for internal consumption and for the market.<sup>25</sup>

Since 1993, the Italian production of CNCs (only devices) has considerably increased, so much so that in 1997 more than 50% of the whole internal demand was

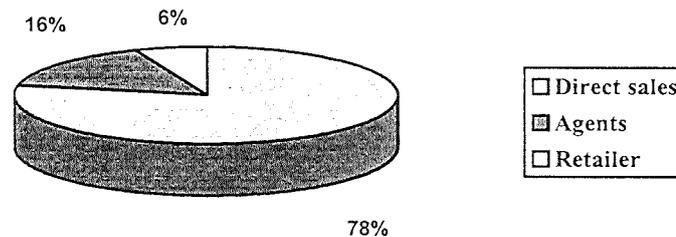
<sup>23</sup> See *Il Sole 24 Ore* (3/10/98).

<sup>24</sup> <http://mmsonline.com/reports/>

<sup>25</sup> Mandelli, Eltag and Fidia produced also the related software. See CTI II (1994).

satisfied by internal consumption.<sup>26</sup> In addition, the growing complexity of electronic devices and the need to personalize the product, force CNC producers to collaborate with their main customers (machine-tool builders) and to sell their products directly without relying on agents (see Figure 7.6).

Figure 7.6 Sales channels on the market of CNCs (1997)



Source: Tecnologie meccaniche (1998a).

The relationship with the suppliers of CNCs appears to be closer than that with the other suppliers (see Table 7.11). Differences in mean are statistically significant at the 99% level.

Table 7.11 Type of relationship with the suppliers (CNC)

	N	Min.	Max.	Mean	Std. Deviation
Long-term=1 Short-term=7	18	1	3	1.5	0.61
Tight=1 Loose=7	18	1	2	1.44	0.51

Source: COPI survey.

Currently the major exporters to Italy of CNCs are Germany (40%) and Luxemburg (37%). This is probably due to the geographic proximity, which favors close relationships among firms. The United States and Japan play now a very limited role, together exporting less than 5% of the total Italian imports of CNCs.

As for the employees, we mentioned in Chapter 3 and in the two case studies (Chapter 5 and 6) that in Italy they appear to be strongly *included*. This feeling of *inclusion* derives mainly from the legislation on job protection and even more from

<sup>26</sup> See Tecnologie meccaniche (1998a).

the common type of relationship between employees and employers based on trust and reciprocal commitment. Table 7.12 reports the results in the COPI survey for the following question: “If it seemed to the top management that the firm could gain in profit over the next three years by a strategy which involved dismissing a substantial number of employees, which of the following considerations would weigh against this, and how strongly?” The directors that participated to the COPI survey gave to the options “Problems of conscience: inner feeling of responsibility to the employees” and “Social position in the local community would make it difficult”, some of the highest marks, even higher than to “Effectively blocked by our legal obligations to the workforce”.

**Table 7.12 If it seemed to the top management that the firm could gain in profit over the next three years by a strategy which involved dismissing a substantial number of employees, which of the following considerations would weigh against this, and how strongly?**

1= would not have any influence, 7= would have a major influence	N	Min.	Max.	Mean	Std. deviation
Problems of conscience: inner feeling of responsibility to the employees	16	1	7	5.31	1.81
Social position in the local community would make it difficult	16	1	7	4.06	1.806
Would throw away skills which are likely to be valuable and thus in the long-run might be self-defeating	16	2	7	5.7	1.4
Would damage the co-operative relationship between employees and management and in the long-run be self-defeating	16	1	7	4.2	1.8
The union would react by a damaging strike or other industrial action	16	1	6	3.9	1.8
The workers would obstruct it by using their powers under co-determination	15	1	7	3.0	1.7
Effectively blocked by our legal obligations to the workforce	16	1	6	2.75	1.61
Financial interests of shareholders	15	1	6	2.8	1.7
Credibility towards providers of debt (banks)	14	1	6	3.07	1.9

Source: COPI survey.

Knowing that they will hardly ever lose their jobs and that their interests are kept in consideration regarding the formulation of the firm’s strategy, Italian employees should have all the incentives to participate to the innovation process, accumulating industry and firm-specific skills and contributing to the cumulative learning. The process of skills accumulation is in fact not at risk as suggested for the

case of the US by Blair (1995).<sup>27</sup> The real situation is, however, rather different from what it seems. Firstly, as opposed to Germany for example, a blue collar worker in a machine-tool firm is not especially held in high esteem within the community. Secondly, the lack of any agreement or any form of communication between firms and educational institutions turns into a lack of personnel with those specific skills that are needed more by the machine-tool builders (see Table 7.13). Students need to be trained on the job. However, this is not always possible, as the type of skills that the employees are required to have in this sector are now rather high-tech and not many SMEs have sufficient resources to invest in this type of training. Some support is offered by UCIMU. However, if Italy was to develop some type of vocational training similar to the German one, machine-tool builders could rely on a much more skilled employment base.

**Table 7.13 What is the role played by the educational system in preparing the students to work in the machine-tool sector?**

	N	Min.	Max.	Mean	Std. Deviation
Null=1 Essential=7	20	1	4	2.25	1.01

Source: COPI survey.

Thirdly, even if there is a high degree of *inclusion*, the delegation of responsibilities to the lower levels in the organisation has up until now been rather low. This is mainly due to the presence of the owners among the management team as they usually want to keep everything under their control. This means that firms are not taking full advantage of the innovative potential of their employees. In fact, as it was explained in Chapter 4, the cumulative learning acquired on the shop floor is an essential source of innovation in this sector and if employees are not granted some freedom of action to use their competence and skills, they will not be able to contribute to the innovation process.

Only recently, firms seem to have realised the great potential of the existing *inclusion*. For example, UCIMU, in collaboration with some of the associate firms, is organising a promotional operation to explain to young students what it really means to work for a machine-tool firm. The operation is called “Factory for Man”<sup>28</sup> and since its launch it interested 15,000 young people. The main theme is that UCIMU

<sup>27</sup> See Chapter 1.

<sup>28</sup> See UCIMU’s web page.

and the associated firms are some of the main interpreters of the process of empowerment of the employees. In the new scenario, each worker will have more autonomy, responsibility, and space for creativity and imagination, giving back the role of protagonist within the firm to the employees (managers or blue collars).

To summarize and conclude, Italian machine-tool builders seem to have included those stakeholders that play a major role in the innovation process. The situation with the employees is rather critical in the sense that even if included, up until now they have not had much space to contribute to the process of innovation, having little responsibility and not being used to work in groups. In addition, there is a strong need of some kind of support from the educational system, if machine-tool builders are to keep their products at the technological frontier.

### 7.3.4 Novelty

The degree of *novelty* is medium in the machine-tool sector, with few but high peaks, mainly due to inventions in electronics. New start-up firms in this sector do not have an advantage over established firms, as the accumulated knowledge is important and close long-term agreements with suppliers and customers, so essential in this sector, require time to be set up. The *inclusion* of the employees could cause some problems of conservatism when important changes need to be made but this does not seem to have caused problems at the time of the introduction of CNCs. The President of Stam said that even if the introduction of CNCs represented a critical turning point it happened gradually, starting only with one or two machines the first year. The employees did not have serious problems in adapting to the new technology and the support of UCIMU in re-training those who needed to be re-trained, played an important role.

**Table 7.14 With respect to (1) Change in processes, (2) Product Innovation, how would you describe the attitude of manual production employees?**

1=Deliberately obstruct change 7=Thoroughly cooperative attitude	N	Min.	Max.	Mean	Std. Deviation
Change in process	20	2	7	4.15	1.2
Product innovation	20	4	7	5.4	1.04

Source: COPI survey.

Furthermore, as employees are quite sure that they are not going to lose their jobs, they usually do not try to obstruct change, both of product innovations and of process innovations (see Table 7.14).

#### **7.4 Groups of firms, independent firms and innovation**

The consultants of UCIMU (Italian Machine-tool Builders association) claim that Italian machine-tool producers should merge or form groups of firms in order to increase their scale and the level of investment in innovation. This is because, they argue, Italian firms are too small to channel sufficient resources to R&D (and marketing and after-sales service) and this would cause a loss of competitiveness in this current high technology era. On the contrary, large firms and in particular groups of firms would be able to allocate the “appropriate” spending in innovation, and, in any case to reach a much higher level of R&D spending.

The theoretical foundations of this claim can be found in the literature about capital market imperfections and financial constraints. As argued by Modigliani and Miller (1958), in a situation of perfect capital markets, the financial structure of a firm should not influence the number and size of its investments. The latter, on the contrary, should be driven only by expected future profitability. Internal and external sources of finance would be perfect substitutes for each other and belonging or not to a group would not influence the availability of funds. Since 1958 the assumption of perfect capital markets has been challenged many times, both in theoretical and empirical terms, mainly on the grounds that there are clear imperfections in capital markets such as managerial agency problems, transaction costs and asymmetric information.

Due to information asymmetries, high-technology firms usually face higher financial constraints than low-technology firms. This is because, on the one hand, they have to sell their equities at a discount (Myers and Majluf, 1984) and on the other, banks tend to ration their credit (Stiglitz and Weiss, 1981). In fact, as emphasised by Stephan (1996) and Dasgupta and David (1994), firms carrying out science-based activities present a higher degree of uncertainty and information asymmetry regarding the value of their projects. This is because the evaluation of investments in innovative activities and in particular of R&D expenditures requires specific competencies that outsider investors do not often have. In addition, in many

industries, patents are not a useful method of appropriating the returns to expenditures for innovation and as a consequence, firms in these industries prefer to keep a high level of secrecy about their projects.

Several studies on the presence of capital constraints<sup>29</sup> have shown that firms belonging to groups of firms appear to be less financially constrained than independent ones. The reasons for this phenomenon appear to be the following. First, firms belonging to groups have easier access to external financial resources, as banks and other financial institutions are aware of the fact that in case of distress they will be able to rely on the resources of the group. Second, capital acquired on the market by low risk firms belonging to the group can be reallocated to high-technology firms. In this case we can argue that there is a double hurdle in the financing process. In fact, banks and other financial institutions obtain funds on the market from savers. However, they do not have the necessary competencies to make an economic evaluation of the innovative projects. Hence they would ration credit or ask for a discount on the shares of high-technology firms. On the other hand, those who work within the group, being insiders, are more capable of making a correct evaluation of the projects. Therefore, they can reallocate funds from a firm with easy access to the external market to another firm perceived as very risky by the market. Third, through the internal capital market, the extra liquidity of one or more firms can be reallocated to another firm with temporary liquidity problems. Finally, the holding generally has a higher market power than each subsidiary and can obtain funds at a lower price.

The lower financial constraints faced by firms belonging to groups of firms suggest that these firms have more capital to invest in R&D and other innovative activities and as a consequence should be able to be more innovative. This conclusion is the same as that of the consultants of UCIMU.

There are, however, several arguments against this line of reasoning. First, the studies that deal with financial constraints<sup>30</sup> do not distinguish between low-*visibility* and high-*visibility* sectors and refer to investments in fixed capital<sup>31</sup> (a highly visible expenditure) and not on more general expenditures for innovation. Moreover, as

---

<sup>29</sup> See Schiatarelli and Sembenelli (1996) for Italy, Cho (1995) for Korea, Elston and Albach (1995) for Germany and Schaller (1993) for Canada.

<sup>30</sup> See for example Schiantarelli and Sembenelli (1996).

<sup>31</sup> They basically show that within firms belonging to groups, the level of investment in fixed capital does not change with the cash flow.

previous works have shown,<sup>32</sup> cash flow accounts for less than 10% of the variance in R&D intensity. Furthermore, a linear relationship between R&D and innovation has been proven not to exist.<sup>33</sup> Therefore, even though firms belonging to groups of firms present fewer financial difficulties in carrying out R&D expenditures, they do not necessarily present a higher probability of innovating.

It must also be borne in mind that the machine-tool sector is characterised by low *visibility*. This means the following. On the one hand groups of firms could solve the problems due to the low *firm-specific perceptiveness* of the outsider financiers, as mentioned before. On the other hand, belonging to a group could engender internal problems of the same type. This is because, in general, the various profit centres of a large firm or of a group, be they divisions, product lines or firms of a group, compete for scarce resources. It is usually rather difficult for those who are in control, even if they are insiders, to be perfectly informed of the potentials of each investment project and of the correctness of the expenditures. If the control is carried out primarily through financial indicators, (and there is both considerable hierarchical and geographical dispersion) the “appropriate” and most effective spending on innovation might not be attained, even if there are funds available within the firm or the group. This is even more likely if the group is highly diversified and the production of machine-tools is not part of its core activities.

It is therefore very difficult to anticipate whether belonging to a group of firms or to a large company would automatically mean that more resources would be spent on product innovation, as UCIMU is suggesting.<sup>34</sup> In addition, availability of funds, even if very important, is not the only factor influencing the innovativeness of a firm.

As it will be shown in Section 7.6, the data seem to support our view. Belonging to a group, or having a large scale, does not appear to positively influence the ability to innovate. It must also be added, that SMEs appear to resist the recurring crises in the sector much better than large firms or groups (see *Tecnologie Meccaniche*, 1996). In addition, at the early moment of the introduction of CNCs, Italian firms were among the first firms to introduce them, thanks to the lower fixed

---

<sup>32</sup> See Cohen and Levin (1989).

<sup>33</sup> See Rosenberg (1994).

<sup>34</sup>As a matter of fact, the few attempts to create large groups in Italy were not very successful. Exemplar is the case of Mandelli, which thanks to an expansive strategy had reached the 10<sup>th</sup> position in the European rank but due to the high indebtedness had to start a radical restructuring process.

costs that they had sustained for the production of conventional machines. The flexibility of small firms is one of their main strengths. Even if this sector does not present high levels of *novelty*, the application to machine-tools of innovations occurring in other sectors (mainly electronics) can offer great competitive advantage to those firms that are able to exploit these opportunities faster than the others (see Japan against the US for the case of CNCs).

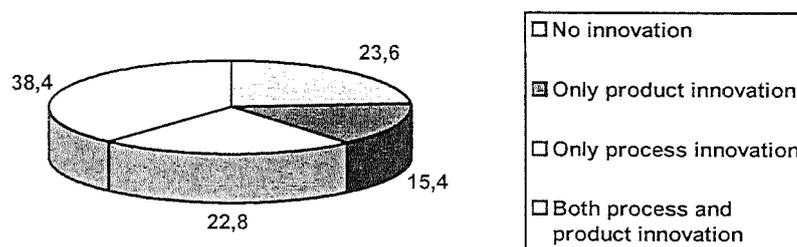
## 7.5 The sample of firms, descriptive statistics and simple inference

In this section, using the Mediocredito database, we will test some of the hypotheses that we have formulated in the previous sections. As mentioned in Chapter 2, the Mediocredito database contains data about 5,415 manufacturing firms for the 1989-1994 period. Out of this universe of firms, a firm is included in the analysis if it belongs to the machine-tool sector (all the firms belonging to the subsets 322.1 and 322.2 of the classification Ateco 1981) and if we have complete data for all the variables included in the econometric specification. The final balanced database is composed of 122 firms. A Probit model was used to estimate the probability that a firm innovates. Dependent, independent variables and descriptive statistics are presented below.

### *INNO*

The dependent variable, *INNO*, is a binary variable indicating whether the firm produced any product innovation in the 1992-1994 period. As shown in Figure 7.7, during this period, 23.6% of the firms did not produce any sort of innovation, 15.4% only product innovation, 22.8% only process innovation, 38.2% both of them. Both those firms that produced only product innovation and those that produced product and process innovation were included in *INNO*=1. Those firms that produced only process innovation or neither product nor process were included in *INNO*=0.

Figure 7.7 Types of innovation in the machine-tool sector



Source: Mediocredito database.

### SCALE

The first independent variable included in the analysis is the scale of the firm and it is calculated as the natural logarithm of the number of employees in 1992.<sup>35</sup>

Table 7.15 Scale

Variable	N	Min.	Max.	Mean	Std. Deviation
Logem	122	1.04	3.34	1.7839	0.4097

Source: own calculation on Mediocredito database.

This variable will have a positive sign if, as suggested by UCIMU, scale plays an essential role in favouring innovation. Instead, it will have a negative sign if problems of internal visibility and scarce flexibility play a much more important role.

### GROUP

Among the 122 firms, 40 of them belong to a group and 82 are independent firms. The variable takes value 1 if the firm belongs to a group and value 0 if it is independent.<sup>36</sup> As it is shown in Table 7.16, on average the percentage of firms that belong to a group of firms and have carried out product innovation is slightly lower (52.6%) than that of independent firms (54.1%), especially when considering firms

<sup>35</sup> The choice of this variable is intended to keep some sort of comparability with Evangelista (1997). In the paper, using the CIS database the author shows that the probability of innovating is positively linked to the scale of a firm (measured in log) and to its belonging to a group of firms. No distinction among sectors is made.

<sup>36</sup> A firm is considered as part of a group if it is controlled, directly or indirectly by another company or if it controls, directly or indirectly another company.

with less than 250 employees. Differences between the proportions are however not statistically significant (a z-test analysis was employed).

**Table 7.16 Product innovation in groups and independent firms**

Classes of employees	PRODUCT INNOVATION Firms belonging to a group		PRODUCT INNOVATION Firms not belonging to a group	
	NO	YES	NO	YES
11-20	--	--	60%	40%
21-50	71.4%	28.6%	53.4%	46.6%
51-250	41.7%	58.3%	34.3%	65.7%
251-500	20%	80%	50%	50%
>500	100%	--	--	--
<b>Total</b>	47.4%	52.6%	45.9%	54.1%

Source: own calculations on Mediocredito database.

As Table 7.17 shows, firms belonging to groups of firms are on average larger than the independent ones (as measured by employment and sales).

**Table 7.17 Summary statistics: machine-tool producers<sup>37</sup>**

	Group	R&D <sub>92</sub> >0		All firms	
		Mean	St.D	Mean	St.D
Sales <sub>92</sub> **	Yes			28536.40	18900.16
	No			12692.50	15131.05
Employment <sub>92</sub> **	Yes			122.80	78.78
	No			61.39	55.49
R&D <sub>92</sub> /Sales <sub>92</sub>	Yes	3.26	4.6	3.02	4.5
	No	3.18	3.29	2.7	3.2
R&D <sub>92</sub> /K <sub>91</sub> *	Yes	3.2	7.6	1.90	6.07
	No	5.1	0.4	0.222	0.7574

\*\* Differences in means significant at the 1% level

\* Differences in means significant at the 5% level.

Source: own calculations on Mediocredito database.

The R&D intensity relative to sales is higher, but not significantly higher, in groups than in independent firms, when all firms are included in the analysis and also in the smaller subset. The intensity relative to total assets is instead significantly higher in groups than in independent firms when all firms are considered, and significantly higher in independent firms when only firms that carried on R&D in 1992 are included.

The fact that independent firms that carry on R&D invest on average more relative to assets (statistically significant) than firms belonging to groups, is probably

<sup>37</sup> The results for the other years are similar.

in part due to the fact that in groups, the holding usually carries on R&D for the subsidiaries as well.

**Table 7.18 Degree of autonomy from the Holding in R&D activities**

Classes of employees	R&D carried on totally by the Holding	R&D carried on in part by the firm and in part by the Holding	R&D carried on totally by the firm
11-20	--	--	--
21-50	20%	0	80%
51-250	20.8%	12.5%	66.7%
251-500	0	60%	40%
>500	0	0	100%
<b>Total</b>	16.667%	16.666%	66.667%

Source: own calculations on Mediocredito database.

As it can be seen in Table 7.18, for at least 20% of the firms with less than 250 employees and subsidiaries of a group of firms, all the R&D activity is carried on by the Holding. This could explain the fact that the R&D intensity of firms up to 50 employees and belonging to groups is much lower than that of independent firms. As in each subset there are less than 30 firms, we cannot draw any conclusion about the difference in proportions.

**Table 7.19 R&D intensity in 1992 (R&D expenditure /sales)**

Classes of employees	Total	Firms belonging to groups	Independent firms
11-20	3.9	--	3.9
21-50	4.07	3.5	4.21
51-250	2.89	3.4	2.5
251-500	2.41	2.06	1.3
>500	3.02	3.02	--
<b>Total</b>	3.21	3.26	3.18

Source: own calculations on Mediocredito database. Only firms that have carried out R&D in 1992 are included.

As shown in Table 7.19, both among independent firms and groups, the largest firms have the smallest R&D intensity (apart from the unique firm with more than 500 employees), which is probably due to the fact that small firms encounter some minimum limits of investment under which it becomes not effective to carry on any sort of R&D activity. If we consider only those firms that belong to groups and that carry on all the R&D activities on their own, we can see that small subsidiaries (11-50 employees) have a lower R&D intensity than independent firms (see Table 7.20). In all the other cases the intensity is much higher within groups than for independent firms and, in general, it is higher in the holding, followed by the intermediate firms and finally by the subsidiaries. Again the number of firms in each

subset is lower than 30, therefore we cannot draw any conclusion about the differences in means.

Table 7.20 R&D intensity (R&D expenditure/sales) in 1992

Classes of employees	R&D intensity of firms that carry on their R&D in groups of firms and are subsidiaries	R&D intensity of firms that carry on their R&D in groups of firms and are in an intermediate position	R&D intensity of firms that carry on their R&D in groups of firms and are holdings	Independent firms
11-20	--	--	--	3.9
21-50	2.38	--	--	4.21
51-250	2.62	3.58	7.8	2.5
251-500	2.51	2.97	--	1.3
>500	--	1.67	--	--
Total	2.55	2.84	7.8	3.18

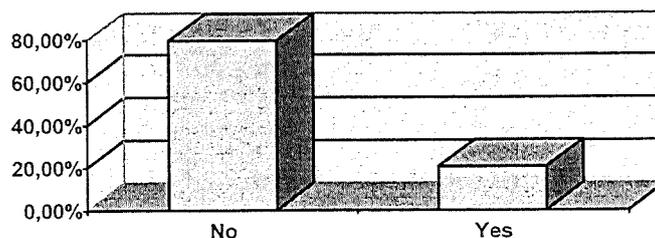
Source: own calculations on Mediocredito database. Only firms with  $R\&D_{02} > 0$  were included.

As we mentioned above, it is very difficult to make assumptions about the role played by groups of firms on innovation in the machine-tool sector as several factors operate in opposite directions (i.e. finance against visibility). If the importance of the support provided by a group of firms is much stronger than all the factors that negatively influence the degree of visibility, the variable will have a positive sign, negative otherwise.

#### *EXTERNALF*

This variable is equal to 1 if the firm received any form of external financing (bank loans, public funding, European funding) for its innovative activities, 0 otherwise. We expect a positive sign, since, as mentioned before, machine-tool firms are very small and financing R&D and other innovative activities with internal funds is very often not possible. As it is shown in Figure 7.8, nearly 80% of the firms did not receive any form of external financing.

Figure 7.8 Use of external financing for innovation



Source: own calculations on Mediocredito database.

### *RDINTENSITY<sub>92</sub>*

The R&D intensity in 1992 is calculated as the total R&D expenditure in 1992 divided by the level of sales in the same period. In 1992 as many as 55 firms did not carry on any sort of R&D activity. The descriptive statistics for this variable can be found in Table 7.19. As mentioned before, several studies have tried to prove the positive influence of R&D on innovation and very few have had positive results.

### *TYPE OF SHAREHOLDERS*

The third and fourth variables included in the analysis answer to a corporate governance type of question and refer to one of the characteristics of the two largest shareholders. The variables (Typea and Typeb) assume value 1 if the shareholder is an individual and 0 if it is an individual resident abroad, another firm, bank or financial institution. The value 0 in variable Typeb comprises also the case when there is not a second shareholder (i.e. the first shareholder has an absolute ownership over the firm). This subdivision is meant to highlight the cases where the internal visibility is higher, such as when the majority shareholder is an individual, and where it is more likely to be lower, such as when there are one or more hierarchical levels or a geographical distance between the firm and the shareholders. However, we must admit that this subdivision might cover cases where there is a financial holding owning the shares of the firm and an individual owning the shares of the holding and having direct control over the firm. In this particular case, the visibility will be high but the shareholder will be indicated as a zero type. The lack of other information does not allow us to be more precise.

As for the sign, we expect at least one of the two variables to have a positive sign because the presence of an insider (individual shareholder with a large stake) should help reducing the visibility problems. If both the variables have a negative sign, this means that being part of a larger organisation (group or multinational) has many more advantages (financial or in terms of industrial synergies with the other members) than disadvantages.

The variable First Shareholder differs from the variable Group. In fact, the firm could have an individual as first shareholder and still be part of a group as

headquarters. As it is shown in Table 7.21, the first and the second (when they exist) shareholders are for the vast majority private individuals.

**Table 7.21 Shareholders' type**

	N	1	0
<b>First shareholder</b>	122	73%	27%
<b>Second shareholder</b>	122	76.2%	23.8%

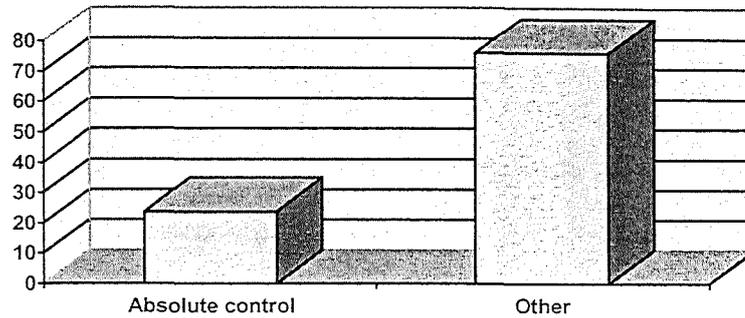
Source: own calculations on Mediocredito database

### *CONTROL*

This variable assumes value 1 if there is only one shareholder with direct control over the firm, where for direct control it is meant an active participation in the decision making. The variable includes both the cases when there is only one shareholder and those when there is more than one shareholder but only one has direct control over the firm. There are not cases where none of the shareholders have direct control, or in other words there are not cases of managerial control. There are several situations where there are three or more large shareholders but only one of them has direct control and the others do not have a concrete interest in the activity of the firm. This is often the case in the presence of a family business where the shares are distributed among the members of the family for tax reasons. When the shareholder with direct control is another firm, it is meant that in effect there is not influence of other shareholders in the decision-making and that the mother firm sets the strategy for the daughter. As it is shown in Figure 7.9, the number of cases with absolute control is rather low.

We expect the sign of this variable to be positive because the presence of numerous parties in control might undermine the stability of the firm's strategy, and hinder the close long-term relationships with employees, customers and suppliers, which are so important in the innovation process. In fact, when there is more than one shareholder with control over the firm, and, for example, none of them with an absolute majority stake, changing coalitions among the shareholders could cause drastic shifts in the strategy of a firm. This could make it difficult to obtain the cooperation of other stakeholders.

Figure 7.9 Type of control



Source: own calculations on Mediocredito database.

### *FAM*

This variable takes the value 1 if there are family links between any of the first four shareholders, 0 otherwise. In line with the existence of an absolute control, the presence of family links ensures some sort of continuity in the strategy of the firm. In fact, even when there is more than one shareholder with control over the firm, the fact that they belong to the same family gives some sort of guarantee to the crucial stakeholders that the attitude towards them and the strategy of the firm in general will not change suddenly. We expect therefore a positive sign from this variable.

Table 7.22 Descriptive statistics for FAM and AGREEMENT

		Frequency	Percent
FAM	1	44	36.1
	0	78	63.9
AGREEMENT	1	20	16.4
	0	102	83.6

Source: own calculations on Mediocredito database.

### *SHAREA*

This variable corresponds to the percentage share of the majority shareholder. We expect this variable to be negative as a lower concentration of ownership, without losing control, could increase the availability of capital. As it can be seen in Table 7.23, on average the majority shareholder has an absolute control over the firm with more than half of the shares (59.385%). None of the majority shareholders owns less than 10% of the stakes. The average stake of the second shareholder is much

lower (22.5%) and that of the third even lower (8.9%). The dispersion of ownership is very low and on average the first two shareholders own together more than 80% of the shares.

Other measures of dispersion and concentration of ownership did not provide statistically significant results and were excluded from the econometric specification.

**Table 7.23 Descriptive statistics**

Percentage shares	N	Min.	Max.	Mean	St.D
First shareholder	122	10	100	59.385	27.012
Second shareholder	122	0	62.5	22.486	15.924
Third shareholder	122	0	33.4	8.902	9.962
100-shares1-shares2	122	0	90	18.129	19.25

Source: own calculation on Mediocredito database.

### *AGREEMENT*

This variable takes value 1 if none of the shareholders has the absolute majority of shares but control is guaranteed by an agreement among some or all of the shareholders and there are not family links among them. We do not know what to expect for the sign of this variable. In fact, if the agreement is considered as stable as a family link the variable might have a positive sign. If not, it will have a negative sign. See Table 7.22, for descriptive statistics of this variable.

## **7.6 Empirical results: econometric analysis**

The econometric analysis estimated the impact of firms' characteristics, structure of ownership and control on the probability of innovating of a firm. Estimation is by maximum likelihood and was performed using Eviews software. EViews uses quadratic hill-climbing to obtain parameter estimates. This algorithm uses the matrix of analytic second derivatives of the log likelihood in forming iteration updates and in computing the estimated covariance matrix of the coefficients. Convergence usually occurs in four iterations, which suggests "peaked" likelihood function.

Table 7.24 reports the coefficient estimates, asymptotic standard errors, z-statistics, corresponding p-values and marginal effects.

The overall fit of the model is satisfactory as measured by the Mc Fadden R-squared of 0.203109, which is rather high given the fact that the model is cross

sectional. Using a cutoff of 0.5 the model produces 68.85% of correct predictions. The LR test of the joint null hypothesis that all slope coefficients except the constant are zero produces a test statistic of 34.24, which exceeds the  $\chi^2_{0.01}(10)$  critical value of 23.21. The null hypothesis is therefore rejected and it is appropriate to proceed with the discussion of the estimated coefficients and marginal effects.

**Table 7.24** Probit for full sample.

Dependent Variable: INNO  
 Method: ML - Binary Probit  
 Sample: 1 122  
 Included observations: 122  
 Convergence achieved after 4 iterations  
 Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effects <sup>38</sup>
C	-0.387266	1.192827	-0.324662	0.7454	-0.100970
LOGEM92	0.249840	0.388267	0.643474	0.5199	0.651393
GROUP	0.010178	0.430447	0.023646	0.9811	0.002653
EXTERNALF	0.611633	0.365025	1.675589	0.0938*	0.159467
RDINTENSITY92	0.076183	0.042913	1.775267	0.0759*	0.019862
TYPEA	-1.096995	0.500924	-2.189941	0.0285**	-0.286013
TYPEB	1.108951	0.432668	2.563052	0.0104**	0.289130
CONTROL	0.925257	0.363384	2.546224	0.0109**	0.241236
FAM	0.823655	0.408538	2.016103	0.0438**	0.214746
SHAREA	-0.014675	0.007289	-2.013503	0.0441**	-0.003826
AGREEMENT	-0.265183	0.461572	-0.574522	0.5656	-0.069140
Mean dependent var	0.532787	S.D. dependent var		0.500981	
S.E. of regression	0.456710	Avg. log likelihood		-0.550648	
Sum squared resid	23.15285	McFadden R-squared		0.203109	
Log likelihood	-67.17912				
Restr. log likelihood	-84.30147				
LR statistic (10 df)	34.24471				
Probability(LR stat)	0.000168				
Obs with Dep=0	57	Total obs		122	
Obs with Dep=1	65				

\* Significant at the 10% level.  
 \*\* Significant at the 5% level.  
 \*\*\* Significant at the 1% level.

A firm was more likely to innovate if it obtained external sources of finance; it had a positive and high R&D expenditure relative to sales; the control was concentrated in the hands of one single person or firm; the majority shareholder was not an individual; the second shareholder existed and was an individual; there were family links among some or all of the majority shareholders and the lower was the

<sup>38</sup> Eviews does not calculate marginal effects automatically and they had to be calculated manually following the procedure explained in Greene (1993). We evaluated the marginal effects at every observation and used the sample average of the individual marginal effects.

stake of the majority shareholder. All variables except LOGEM, GROUP, and AGREEMENT were statistically significant. TYPEA, TYPEB, CONTROL, FAM, SHAREA at the 5% level and EXTERNALF and RDINTENSITY at the 10% level. All the variables had the expected signs.

As it can be seen in Table 7.24, the variables LOGEM92 and GROUP have a positive sign (which would support the arguments of UCIMU) but they are not statistically significant, which means that we cannot conclude anything about the role played by these factors on the probability of innovating within a firm. This seems to support the idea that the difficulties which large organizations usually face in coping with a low degree of *visibility*, indicated by several sources and by the Danieli case study, tend to offset the advantages of using internal capital markets and other sorts of synergies.

As for the other variables, they all appear to support the findings of the case studies and of the COPI survey. Insider shareholders (TYPEB), who have a high degree of *firm-specific perceptiveness*, appear to cope well with the low *visibility* characterizing the sector, and, therefore, to favor innovation. When the stability of control is ensured by the presence of a single majority shareholder (CONTROL) or of a coalition of members of the same family (FAM), the probability of innovating is higher. This is probably due to a perception that the stability of control guarantees that the agreements with various stakeholders will not be broken in the long-term, which, as explained before, is essential for innovation in this sector.

The case study of Stam, the results of the COPI survey and several other sources show that Italian machine-tool producers do not receive much support from banks or other financial institutions, as the latter appear not to have the appropriate degree of *firm-specific perceptiveness* or *industry-specific expertise*. For this reason, Italian machine-tool firms are frequently forced to rely only on their internal sources of finance, which are not always sufficient. Many of the results of the econometric analysis are in line with these findings. In fact, when the first majority shareholder is not an individual (TYPEA) (and the second shareholder is an individual in order to avoid problems due to the low *visibility*, see Section 7.4) there is a higher probability of innovating. This is probably because in this way the firm can rely on the support of the other firm, bank or financial institution which controls it. Moreover, also receiving external sources of finance (EXTERNALF) is positive for innovation, which supports the argument that the internal ones are not always sufficient to

finance R&D activities and more general expenditures in innovation. Finally, the probability of innovating is higher when the share of the majority shareholder (SHAREA) is lower. In fact, a low concentration of ownership allows the injection of external capital and reduces risk.

The Mediocredito database employed in the econometric analysis does not address all the elements of the COPI framework, as the data were collected for a different purpose. However, the data triangulation appears to have worked effectively. In fact, the results of the econometric analysis support and to some extent complete the findings of the two case studies and of the COPI survey. In particular, it is noteworthy that among the variables that play a statistically significant role on the probability of innovating, the corporate governance ones (TYPEA, TYPEB, CONTROL and FAM) have the higher marginal effects.

**Table 7.25** Probit for reduced sample

Dependent Variable: INNO

Method: ML - Binary Probit

Sample: 1 2 4 46 53 62 64 67 69 71 73 108 112 113

Included observations: 100

Convergence achieved after 4 iterations

Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Marginal effects
C	-0.505467	1.383970	-0.365230	0.7149	-0.273591
LOGEM92	0.196229	0.459970	0.426612	0.6697	0.106212
GROUP	-0.065065	0.505663	-0.128673	0.8976	-0.035217
EXTERNALF	0.666674	0.486460	1.370459	0.1705	0.360846
RSINTES92	0.109949	0.052715	2.085740	0.0370**	0.059511
TYPEA	-1.587156	0.638589	-2.485409	0.0129**	-0.859070
TYPEB	1.312649	0.515274	2.547476	0.0109**	0.710489
CONTROL	1.448412	0.461231	3.140317	0.0017***	0.783973
FAM	1.845648	0.561321	3.288044	0.0010***	0.998982
SHAREA	-0.019560	0.008672	-2.255578	0.0241**	-0.010587
AGREEMENT	0.160358	0.542430	0.295629	0.7675	0.086796
Mean dependent var	0.540000	S.D. dependent var	0.500908		
S.E. of regression	0.422093	Avg. log likelihood	-0.465248		
Sum squared resid	15.85645	McFadden R-squared	0.325673		
Log likelihood	-46.52477				
Restr. log likelihood	-68.99438				
LR statistic (10 df)	44.93922				
Probability(LR stat)	2.23E-06				
Obs with Dep=0	46	Total obs	100		
Obs with Dep=1	54				

\* Significant at the 10% level.

\*\* Significant at the 5% level.

\*\*\* Significant at the 1% level.

As it can be seen in Table 7.25, even when 22 of the firms are taken out of the sample,<sup>39</sup> the results are still robust. All the significant variables maintain the same sign and all of the variables that were significant before, apart from EXTERNALF, are still statistically significant or even more significant. The variables that were not significant before are still not statistically significant. The LR statistic exceeds the  $\chi^2_{0.01}$  (10) critical value of 23.21 thus rejecting the null hypothesis that all of the coefficients, except for the constant, have value zero. The McFadden R-squared goes up to 0.3256 and the percentage of correct predictions increases from 68.85% to 71.13%. Convergence is still achieved in 4 iterations.

---

<sup>39</sup> The firms were chosen randomly as Eviews, as opposed to other programs such as Shazam for example, does not offer an in-built option.

## Conclusion

In this thesis we have studied the relationship between corporate governance and product innovation with a particular reference to the Italian machine-tool sector. The thesis is inspired by a new theoretical framework that claims that the existing systems of corporate governance differ in their capacity to cope with three types of factors characterising innovation, namely *visibility*, *appropriability* and *novelty*, which vary among sectors. No system appears to be the *one best way* and each system presents advantages and disadvantages according to the industrial sector under consideration.

As shown in Chapter 1, the study of the relationship between corporate governance and product innovation is a new avenue of research. The debate on corporate governance typically never refers to issues concerning innovation. Similarly studies on innovation typically never consider corporate governance as one of the possible influencing factors. Not even within the National Systems of Innovation approach, has any author ever considered corporate governance as one of the central components of innovation systems.

Before proceeding with the study of the machine-tool sector, it was necessary to analyse the Italian system of corporate governance from the point of view of the chosen framework. In Chapter 3, we illustrate the main elements characterising the Italian system and we conclude that it can be ranked, unambiguously, among the insider systems. Moreover, using the terminology of the framework, the Italian system of corporate governance appears to be characterised by a high degree of *firm-specific perceptiveness* and medium-low *industry-specific expertise* of those who actually finance innovation, and a rather high *inclusion* of the stakeholders. These characteristics, according to the framework, give Italian firms a competitive advantage in sectors characterised by a low degree of *visibility*, a medium-low degree of *novelty* and a low degree of *appropriability*, such as prevails for example in most of the engineering sectors. On the other hand, Italy is not expected to be successful in sectors characterised by a high degree of *novelty*, such as the chemicals, pharmaceuticals and electronics sectors. Firms will in fact lack appropriate forms of financing and will have difficulties in following the latest developments in the market due to the close long-term relationships with customers, suppliers and

employees. The data concerning the Italian industrial specialisation for the years 1987-1991 appear to support this theory, in the sense that Italy appears to be more specialised in the engineering sectors rather than in other sectors characterised by high *novelty*.

In Chapter 3 we also discuss the latest developments of the Italian system, referring to the growth of the stock exchange, the institution of the *Piccolo Mercato*, the progresses of the venture capital market and the Draghi reform. The evidence seems to suggest that the Italian system of corporate governance is moving towards the outsider end of the continuum. This process has certainly been very positive for Italy. However, if it has occurred without a complete awareness of its consequences, Italy could find itself “stuck in the middle” (Porter, 1985). In fact, as explained in Chapter 3, with the shift towards the outsider end of the continuum, there could be important consequences that could reduce the advantages that Italy has now in sectors characterised by low *visibility*, low *appropriability* and low *novelty*. For example, if the presence of insider shareholders was to be reduced and banks and other financial institutions did not assume a long-term perspective; and if the role played by the important stakeholders started to be neglected and firms adopted a strategy for the maximisation of the shareholders’ value (as suggested by the Code of Conduct), then the strengths of Italy in such sectors could vanish. On the other hand, Italy’s strengths in sectors characterised by high *visibility*, high *appropriability* and high *novelty* are still rather underdeveloped in comparison with the outsider countries. In fact, the Italian private equity and venture capital markets are developing but still very small in comparison with the American one. Further, legislation on job protection would impede firms from pursuing the latest developments in the market, encouraging them in the direction of dismantling subsidiaries, and laying off large sections of the work force if needed. As the framework suggests, there is not a one best way of corporate governance, and each systems possesses strengths and weaknesses according to the sectors in consideration.

In Chapter 4 we use the existing literature on the machine-tool industry to draw conclusions about the degree of *visibility*, *appropriability* and *novelty* of innovations. The importance of secrecy, the limited effectiveness of patenting, the large share of expenditures in low visible activities, such as development and marketing, suggest that the degree of *visibility* is rather low. Moreover, the limited

effectiveness of patenting, the centrality of customers in the innovation process and the great importance of the employees' cumulative learning on the shop floor indicate that the degree of *appropriability* is also rather low. Finally, the continuous adoption by machine-tool builders of innovations produced in other sectors (mainly electronics) and the recurrent crises in the market, suggest that firms in this industry face a medium degree of *novelty*. In Chapter 4 we also try to give an explanation of the upsurge of Japan in the machine tool sector during the 1970s and 1980s and of the contemporaneous decline of the United States. Using existing literature on the topic we show that during the 1970-1990 period the Japanese system of corporate governance appears to have had all the characteristics that, according to the framework, are necessary to cope with the low *visibility*, low *appropriability* and medium *novelty* of the machine-tool sector. The Japanese system is in fact an insider system characterised by a high degree of *firm specific perceptiveness* of those who finance innovation (insider shareholders, in-house banks), a rather high degree of *inclusion* of the stakeholders (close long-term relationships with customers and suppliers, quasi-lifetime employment, good educational system and active participation of the employees in the innovation process) and a medium-high *industry specific expertise* both of financial institutions and of public agencies. On the contrary, the American corporate governance system, being an outsider type of system, has difficulties in coping with the requirements of the machine-tool sector. Firms have dispersed outsider ownership, they keep arms' length relationships with customers and suppliers and have progressively substituted highly skilled workers with machines, losing in this way one of the main sources of incremental innovation. The educational system fails to educate highly skilled workers. Managers are mainly evaluated on the basis of short-term financial indicators and usually suffer short-term pressures, which reduce the expenditures on innovation below what is optimal. Small, family business firms do not receive any form of financial support, either from financial institutions or from the state.

After analysing the machine tool sector in general, we proceeded to focus on the situation in Italy. The available literature was not sufficient to make an appropriate study. Therefore, before proceeding with the analysis of the Mediocredito database and the development of the questionnaire we decided to carry out two exploratory case studies to collect more information. They are presented in Chapters 5 and 6. The case studies allowed us to interpret in a more correct way the

information available in the literature and in the database and to formulate appropriate questions for the survey.

In Chapter 7 we analyse the machine tool sector in Italy in terms of the framework. Italy is at the moment the fourth producer in the world of machine-tools. Italian firms are on average small and are mainly family businesses. This accounts for a high degree of *firm-specific perceptiveness* of those who finance innovation. Managers are not subject to short-term pressure coming from outsider shareholders as most of the shareholders usually work within the firms. The *inclusion* of customers, some of the suppliers, and most of the employees allows them to overcome the problems of low *appropriability* characterizing the sector. The activity of UCIMU (Italian association of machine-tool builders) is of great support in coping with some of the problems that usually affect small firms, helping them to export, to find forms of finance, to carry on some R&D and to test the prototypes. Everything appears to operate in the correct way.

However, there is also the other side of the coin. In fact, the progressive globalization of the market, the increased competition, the higher level of technology embodied in the machines, the high quality requirements and the progressive substitution of single machines with FMS (Flexible Manufacturing Systems) make it progressively more difficult for SMEs to keep their market share. Internal funds are no longer sufficient to finance the higher investments required for R&D, for marketing activities and for the circulating capital (producing a single machine was already difficult to afford for a small firm, producing complete FMS is basically impossible). The problems that have always been lamented by Italian machine-tool builders (the lack of support from the banking system and the fact that public funds are difficult to obtain) are becoming now even more pressing. So much so, that in the past decade Italian machine-tool builders have started lobbying the government to obtain special legislation in favor of mergers and acquisitions. However, according to our econometric study, larger firms, that usually take the form of groups of firms, do not appear to have a higher degree of innovativeness than smaller independent ones. The involvement of a shareholder in the management of a firm appears to be very important for the innovativeness of a firm. This is because, we argued, the *visibility* problems are so stringent that only those who are directly involved in the activity of a firm can actually verify that the funds invested in development activities or in

developing and maintaining close relationship with customers, are not just being wasted.

It must not be forgotten that this policy was tried, and it failed, both in Britain and Germany, and the process of consolidation which occurred in the US during the 1980s did not give positive results. Small firms have proved to cope much better than the larger ones, not only with the periodical crises characterizing the sector but also with the occasional peaks in novelty (see the introduction of CNCs in 1970s). Therefore, a wave of mergers and acquisitions (which is anyway very unlikely as Italian entrepreneurs are rather unwilling to sell their family business) could not be the best solution to the problems of Italian small and medium firms in the machine-tool sector.

Currently, UCIMU is also suggesting that Italian machine tool builders should get listed on the Piccolo Mercato. This could be a good source of funding. Our econometric results show that a lower concentration of property favours innovation. However, on the one hand it appears that Italian entrepreneurs are not very willing to sell parts of their companies to outsider shareholders. On the other hand, Italian savers are just now starting to buy shares on the stock exchange in large numbers and it is difficult to make any statement about their attitude. For example, American companies did not benefit from the listing on the stock exchange, since, as opposed to German and Japanese firms, they could not rely on providers of finance with a long-term view. Short-term pressures were some of the most important factors hindering innovation in American firms during the 1970s and 1980s. Our case study of Danieli (Chapter 6) did not help us to make judgements about the typical Italian investor, as the firm does not pay attention to the price of its own shares. This strategy for collecting money should therefore be analysed with more accuracy before it is taken up by a large number of firms.

We also found that concentration of control and the presence of a family link among the four majority shareholders have a positive influence on the innovativeness of a firm. The listing on the stock exchange should be done keeping these results in mind.

There are other means of solving the problems of Italian machine-tool builders. Firstly, there is the need to develop strong and close relationships with a few financial institutions with a specific expertise in the sector. UCIMU could foster those relationships, for example, offering training courses to the employees of the

financial institutions to develop a good understanding of the sector. Secondly, the application procedures for public funding should be further simplified so that also the smallest firms could apply. If UCIMU is already offering consultancy services in this sense, such services should be further improved and, possibly, an office should be opened also in the eastern regions to allow all the firms to easily take advantage of these services. Third, there is a need to set up more numerous strategic alliances among competing firms for joint development and commercialisation of new products. Firms, with the support of UCIMU, have already been moving in this direction, but there is still a lot that can be done. Machine-tool builders need to realise that by focusing on a global market, they have a much larger pool of potential customers, and no longer need to consider their neighbours as competitors.

Another set of policies is with regard to the relationship with the educational system and the employees. It is necessary to develop strong relationships with secondary schools and universities to prepare future employees for the workplace. In fact, the latest developments in technology not only require a much more skilled workforce, but also require that these people know how to work in autonomous groups. The educational system should both work on the technical skills of the students and on their capacity for taking decisions and assuming responsibilities. In fact, as mentioned before, firms are progressively delegating responsibilities to the lower levels in the organisation, as this is the only way to take advantage of the high *inclusion* of the employees and of their knowledge accumulated on the shop floor. The employees, therefore, need to know how to take on those responsibilities. In this way, jobs in this sector would become much more gratifying. They would probably assume a much higher status in society and more youngsters would want to start a career in this field.

Another set of agreements should be set up with universities for joint projects of R&D activities. The support of UCIMU, together with that of universities, could profoundly increase the technical potential of Italian machine-tool builders. Especially now that the Italian university system is being transformed with the introduction of master's degrees, it will be progressively easier to find students in search of important projects to work on, and with the proper infrastructure to carry them out.

To conclude we think that this thesis offers interesting insights on the influence played by corporate governance on product innovation in general and in the machine-tool sector in particular. The analysis of the topic from different angles and with different, but complementary, methods has certainly made the study more interesting. The exploratory case studies allowed us to increase our knowledge of the issues under consideration and to ask more appropriate questions in the questionnaire. The COPI survey facilitated the gathering of further information and enabled us to draw some conclusions on the influence of corporate governance on product innovation. The Mediocredito database allowed us to test some of the hypotheses of the framework and to investigate a number of issues that are currently of great interest for machine tools firms (i.e. the role of groups of firms and of firm's scale on innovation). It is also possible, however, to identify a few weaknesses and to suggest several ways to further improve and complete the analysis.

First, the framework is rather complicated for somebody who is approaching it for the first time. This, together with the excessive length of the questionnaire, has certainly been one of the causes of the low response rate to the survey. A much simpler and more straightforward framework could have produced a much higher response rate. This would have allowed us to perform an econometric analysis and to draw more robust conclusions on the basis of data collected specifically with this purpose. Second, it is rather difficult to quantify the degree of *visibility*, *appropriability* or *novelty* and the degree of *firm-specific perceptiveness* and *industry-specific expertise* and to make comparisons between sectors and between systems of corporate governance. To avoid this problem we could have attempted to build synthetic indices for each of the variables, which would have been more effective for the comparisons.

Another problem is linked to the use of the Mediocredito database. In fact, even if the Mediocredito is a very serious institution, we cannot be completely confident of the quality and soundness of the data as we did not participate in their collection. However, this is one of the richest sources of information about Italian firms, their innovativeness and their corporate governance system. We decided therefore, that it was worthwhile using it.

The study could be completed with comparisons between different sectors and different countries. In particular it would be interesting to compare different sectors within the same country, for example machine tools and chemicals, to verify

whether the same corporate governance system copes well in one sector and not in the other, as the framework suggests. Moreover, it would be interesting to study how different corporate governance systems differ in the way they cope with the same technology. For example, we could compare the Italian and the British corporate governance systems with reference to the machine-tools sector. This we will do, as soon as the data collected by the other teams in the COPI project will be ready to be analysed. Significant results pertaining to these comparisons will give further support to the arguments contained in this thesis.

## Appendix 1. The Mediocredito questionnaire

MEDIOCREDITO CENTRALE

SECTION I -- GENERAL INFORMATION

1. Year of founding of the firm

2. Type of activity

2.1. Sector of activity

2.2. Principal products

2.3. Turnover:

1992:  1993:  1994:

2.3.1 Percentage of turnover from products that have not changed in the last three years:

1992:  1993:  1994:

3. Current juridical form

- Ditta individuale  
 Società di persone  
 Società di capitali  
 Società cooperativa  
 Altra forma giuridica

4. Mergers and acquisitions

4.1. Has the firm performed operations of mergers and acquisitions during the 1992-1994 period?

Yes No

4.2. Has the firm performed operations of de-merger during the period 1992-1994?

Yes No

5. Control of the firm

5.1. List in order of percentage of equity shares the characteristics of those who own and/or control directly the firm

Direct control is performed by those who, usually by voting in the assembly, "pose a determinant influence on the decisions relative to the medium-long term goals of the firm, to the strategies to reach them, to the economic and financial development and to the investments", for example nominating the company organs.

Shareholders	Type of shareholder	Percentage of shares	The shareholder			
			has direct control over the firm		is part of a voting agreement	
Shareholder a	<input type="text"/>	<input type="text"/> %	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Shareholder b	<input type="text"/>	<input type="text"/> %	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Shareholder c	<input type="text"/>	<input type="text"/> %	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Other	<input type="text"/>	<input type="text"/> %	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Total		<input type="text"/> %				

Indicate with:

- 1) Individual non-resident in Italy
- 2) Individual resident in Italy
- 3) Italian firm, private or public (industrial)
- 4) Holding not performing industrial activity
- 5) Banks and other financial institutions

5.2. In case of direct control shared among more than one individual, is there a family link among them?

no  only among few of them  yes, among all of them

**6. Groups of firms**

6.1. Is the firm part of a group of firms?

Yes No

6.2. The firm is:

- Holding
- In an intermediate position
- Only subsidiary

6.3. How many firms (national and foreign) are there in the group?

6.4. In what year was the group established?

6.5. What are, according to the firm, the advantages of the group form?

High  
Medium  
Low

- Better control costs sharing and organizational coordination
- Diversification
- Addition of correlated activities
- Control of suppliers
- Control of distributors
- Fiscal discounts
- Easiness in collecting equity capital
- Risk reduction
- Involvement of family members
- Other \_\_\_\_\_

6.6. Number of employees in the group

6.7. What is the degree of autonomy of the firm from the Headquarters for each of the following functions

Function Degree of autonomy

- Administration
- Finance
- Marketing
- R&D

1=Entirely performed by the Headquarters  
2=The firm has a certain level of autonomy  
3=The firm is totally independent

7. Is the firm part of a "consorzio"

Yes No

- 7.1.  Consorzio for loans
- 7.2.  Consorzio export
- 7.3.  Consorzio R&D
- 7.4.  Other forms

**SECTION II - PERSONNEL**

8. Employed in 1992-1994

	31.12.92	31.12.93	31.12.94	Monthly average 1994
8.1 Entrepreneur and family	_____	_____	_____	_____
8.2 Top managers	_____	_____	_____	_____
8.3 Middle management	_____	_____	_____	_____
8.4 Clerks	_____	_____	_____	_____
8.5 Manual workers	_____	_____	_____	_____
8.6 Total	_____	_____	_____	_____
8.6.1 Part time workers	_____	_____	_____	_____

8.7 Education of the employees      Number at 31.12.94  
 8.7.1 Compulsory school      \_\_\_\_\_  
 8.7.2 High school      \_\_\_\_\_  
 8.7.3 Graduate degree      \_\_\_\_\_

9. Has the firm hired anybody in the period 1992-1994?

Yes                      No

9.1 If Yes, how many?      

1992
1993
1994

      9.1.1 How many with a degree?      

1992
1993
1994

10. How many employees have carried out R&D activity

10.1 1992       10.2 1993       10.4 1994

11. How many employees:

11.1 Were hired with a training contract

11.2 Participated to training public or private courses

	1992	1993	1994
11.1			
11.2			

### SECTION III – THE INVESTMENT ACTIVITY AND R&D

#### R&D

12. In the 1992-1994 period the firm has carried out:

- Product innovation
- Process innovation
- Product and process innovation
- Neither product nor process innovation

13. In the 1992-1994 period, has the firm carried out any type of R&D activity?

Yes                      No

13.1 R&D expenditure

1992       1993       1994

13.2 What was in the 1992-1994 period the contribution of:

13.2.1 In-house R&D labs      

	%
--	---

  
 13.2.2 External R&D labs      

	%
--	---

  
 Total      

	100%
--	------

13.3 What percentage of R&D was devoted to:

13.3.1 Improvement of existing processes      

	%
--	---

  
 13.3.2 Improvement of existing products      

	%
--	---

  
 13.3.3 New product      

	%
--	---

  
 13.3.4 New processes      

	%
--	---

  
 13.3.5 Other      

	%
--	---

  
 Total      

	100%
--	------

13.4 How did you finance your R&D expenditures in the 1992-1994 period?

13.4.1 Equity capital      

	%
--	---

  
 13.4.2 Self-financing      

	%
--	---

  
 13.4.3 Medium long-term loans at a market rate      

	%
--	---

  
 13.4.4 Medium long-term loans at a lower than the market rate      

	%
--	---

  
 13.4.5 European and national public funding      

	%
--	---

  
 13.4.6 Fiscal discounts      

	%
--	---

  
 13.4.7 Other      

	%
--	---

  
 Total      

	100%
--	------

13.5 In the period 1992-1994, had the firm carried out any R&D activity with other firms?

Yes                      No

13.5.1 If Yes, please indicate the percentage of R&D carried out with other firms and their country of origin.

%

13.5.2

USA  
EU  
Extra-EU

**Investments**

**14 Has the firm carried out any investment in fixed capital such as plants, machinery and equipment in the period 1992-1994?**

Yes No

14.1 Investment in fixed capital:

1992  1993  1994

14.2 What percentage of the investments was devote to?

14.2.1 Substitution of plants with equivalent plants	<input type="text"/> %
14.2.2 Substitution of plants with innovative news	<input type="text"/> %
14.2.3 Introduction of new plants equivalent to the existing ones	<input type="text"/> %
14.2.4 Introduction of new innovative plants	<input type="text"/> %
14.2.5 Other	<input type="text"/> %
Total	100%

14.3 With what goals did you make the investments in fixed capital in the period 1992-1994?

High  
Medium  
Low

- Improvement in quality of existing products
- Increase in production of existing products
- Production of new products
- Lower impact on the environment
- Lower use of raw materials
- Lower use of employment
- Other \_\_\_\_\_

14.4 What was in the 1992-1994 period the degree of use of the firm's plants?

1992  % 1993  % 1994  %

14.5 How did you finance your investments in fixed capital in the 1992-1994 period?

14.5.1 Equity capital	<input type="text"/> %
14.5.2 Self-financing	<input type="text"/> %
14.5.3 Medium long-term loans at a market rate	<input type="text"/> %
14.5.4 Medium long-term loans at a lower than the market rate	<input type="text"/> %
14.5.5 European and national public funding	<input type="text"/> %
14.5.6 Leasing	<input type="text"/> %
14.5.7 Fiscal discounts	<input type="text"/> %
14.5.8 Other	<input type="text"/> %
Total	100%

14.6 In 1994 did the firm ask for and not obtain bank loans to finance the investments in fixed capital?

Yes No

14.7 In 1994 the firm would have accepted to pay a higher interests to obtain bank loans to finance investments in fixed capital?

Yes No

**SECTION IV – INTERNATIONALISATION**

**15 Has the firm exported part or all of its products in 1994?**

Yes No

15.1 If Yes, what percentage of the total turnover derives from exported products?  %

Distribution of exports according to:

15.2 Geographical areas

UE	%
Central and Eastern Europe	%
Ex USSR	%
Other European countries	%
Africa	%
US and Canada	%
Central and South America	%
Middle East and other Asia	%
Japan	%
Australia and Oceania	%
Total	100%

15.3 Length of the of extension of payment

None/one month	%
Between 1 and 3 months	%
Between 1 3 and 12 months	%
Between 1 and 2 years	%
Between 2 and 5 years	%
More than 5 years	%
Total	100%

16 In the 1992-1994 period, did the firm:

16.1 buy patents or licenses abroad?	Yes, in the EU	Yes outside the EU	No
16.2 transfer patents or licenses abroad?	Yes, in the EU	Yes outside the EU	No
16.3 sign agreements for production with firms abroad?	Yes, in the EU	Yes outside the EU	No
16.4 sign agreements for marketing and sales with foreign firms?	Yes, in the EU	Yes outside the EU	No
16.5 do FDIs	Yes, in the EU	Yes outside the EU	No

16.5.1 If Yes, please indicate the year and the amount invested

	1992	1993	1994
EU			
Non-EU			

In the period 1992-1994, did the firm:

16.6 carry out operations of commercial penetration in foreign countries?	Yes, in the EU	Yes outside the EU	No
16.6.1 Representative offices	Yes, in the EU	Yes outside the EU	
16.6.2 Sales points	Yes, in the EU	Yes outside the EU	
16.6.3 After-sales assistance points	Yes, in the EU	Yes outside the EU	
16.6.4 Promotional campaigns	Yes, in the EU	Yes outside the EU	
16.6.5 Market research	Yes, in the EU	Yes outside the EU	

16.7 receive any form of assistance abroad from Italian agencies?

	Yes, in the EU	Yes outside the EU	No
16.7.1 ICE	Yes, in the EU	Yes outside the EU	
16.7.2 Embassies	Yes, in the EU	Yes outside the EU	
16.7.3 Camere di commercio	Yes, in the EU	Yes outside the EU	
16.7.4 Banks	Yes, in the EU	Yes outside the EU	
16.7.5 Regions	Yes, in the EU	Yes outside the EU	
16.7.6 Other	Yes, in the EU	Yes outside the EU	

SECTION V – ORGANISATION AND AGREEMENTS

17 How can your turnover be distributed among the various types of customers?

17.1 Direct sale through own commercial structures	%
17.2 Direct sales to shops through own commercial structures	%
17.3 Direct sales to other firms	%
17.4 Direct sales to the public administration	%
17.5 Sale to wholesalers	%
17.6 Production for other firms	%
17.7 Other clients	%
Total	100%

18 What part of the turnover of 1994 derived from products produced on order?

% of total turnover

19 Percentage of the production of 1994 deriving from sub-supply agreements.

% of total turnover

**20 Main competitors of the firm**

High	Medium	Low		High	Medium	Low
			Same province of the firm			Small firm
			Same Region			Medium firms
			Other Italian regions			Large firms
			EU			Multinationals
			Other industrialized countries			
			Developing countries			

**21 In the period 1992-1994, did the firm:**

21.1 buy patents or licenses from Italian firms?	Yes	No
21.2 transfer patents or licenses to Italian firms?	Yes	No
21.3 sign agreements for production with Italian firms?	Yes	No
21.4 sign agreements for marketing and sales Italian firms?	Yes	No

**SECTION VI – FINANCE**

**Risk capital**

**22 Has the firm made use of participative loans since 1992?**

	Yes	No
22.1 Is the firm planning to use participative loans in the next three years?		
Yes	22.2 Reasons:	Financing for investments Firm restructuring Other
No	22.3 Reasons:	The firm does not need risk capital The firm prefers other forms of fin.

**23 Have banks, merchant banks or other financial institutions purchased shares of the firm since 1992?**

Yes	No	
		23.1 If Yes, in what percentage of the capital? <input type="text"/> %
		23.2 Is the firm planning to transfer capital shares to banks, merchant banks or other financial institution in the next three years?
Yes	23.3 Reasons:	Financing for investments Firm restructuring
Probably		Other
No	23.4 Reasons:	The firm does not need risk capital The firm prefers other forms of financing

**Fiscal reductions**

**24 Incentives**

24.1 In the period 1992-1994 did the firm receive financial incentives?

Yes No

24.2 If Yes, please indicate which type of incentives the firm received.

A) Internal activities

	High	Medium	Low
24.2.1 Law in favor of SMEs			
24.2.1.1. L. 1329/65			
24.2.1.2. L.317/91			
24.2.1.3 Other laws in favor of SMEs			
24.2.2 L46/82			
24.2.3 L.64/86			
24.2.4 L. 1142/86			

- 24.2.5 L. 240/81
- 24.2.6 L. 657/77
- 24.2.7 Other

B) External activity

- 24.2.8 L227/77
- 24.2.9 L. 49/87, art.5
- 24.2.10 L. 394.81
- 24.2.11 L.49/87, art. 7
- 24.2.12 L. 100/90
- 24.2.13 L. 304/90
- 24.2.14 Other

**Financial Management**

**25 Does the firm carry out in a continuous and systematic way the financial management?**

Yes No

25.1 If Yes, this is done through:

- Internal structures
- Intermediaries

25.2 The financial services through intermediaries deal with:

High Medium Low

- Treasury management in lire and foreign currency
- Administration
- Fidejussion
- Export finance
- Swaps, Future
- Project finance
- Other \_\_\_\_\_

25.3 Is the firm planning to develop its financial function?

Yes No

25.4 If Yes, this is going to be done through:

- Internal structures
- Intermediaries
- National
- Foreign

**Commercial debts and credits**

**26 Please indicate the total number of suppliers in 1994**

26.1 Please indicate the % of suppliers from which the firm has purchased goods and services with commercial debts in 1994.

a) Firms within the same group	%
b) Other Italian firms	%
c) Other foreign firms	%

26.2 What is the total amount of commercial debts the firm made in 1994?

a) Firms within the same group	
b) Other Italian firms	
c) Other foreign firms	

26.3 What is the average length of the commercial debts made in 1994?

a) Firms within the same group	days
b) Other Italian firms	days
c) Other foreign firms	days

26.4 In what percentage the suppliers that in 1994 granted an extension in the payment, offered a discount for payment in advance?

a) Firms within the same group	%
b) Other Italian firms	%
c) Other foreign firms	%

26.5 What is the average monthly discount for payments in advance?

- a) Firms within the same group 

	% monthly
--	-----------
- b) Other Italian firms 

	% monthly
--	-----------
- c) Other foreign firms 

	% monthly
--	-----------

26.6 In 1994 what % of the commercial debts was paid by the firm after the agreed deadline and what was the average delay?

- a) Firms within the same group 

	%
--	---

	days
--	------
- b) Other Italian firms 

	%
--	---

	days
--	------
- c) Other foreign firms 

	%
--	---

	days
--	------

26.7 During 1994 what percentage of the commercial debt, which was paid after the deadline, involved the payment of a penalty?

- a) Firms within the same group 

	%
--	---
- b) Other Italian firms 

	%
--	---
- c) Other foreign firms 

	%
--	---

26.8 How long after the deadline have the suppliers required the payment of the penalty?

- a) Firms within the same group 

	days
--	------
- b) Other Italian firms 

	days
--	------
- c) Other foreign firms 

	days
--	------

27 What is the total amount of commercial credits granted in 1994?

- a) Firms within the same group 

--
- b) Other Italian firms 

--
- c) Other foreign firms 

--

27.1 What is the average discount granted for payments in advance?

- a) Firms within the same group 

	%
--	---
- b) Other Italian firms 

	%
--	---
- c) Other foreign firms 

	%
--	---

## Appendix 2. The COPI questionnaire



8.d.\*\*Can you foresee the entrance of new shareholders (not belonging to the family) in the next 5 years?

Yes [..]  
 No [..] Please explain \_\_\_\_\_

9. \*\* What priority was given to each of the following stakeholder groups in the company's corporate strategy five years ago and what priority is your company giving to each of its stakeholder groups in its current corporate strategy?

Stakeholder groups	Time frame	No priority							High priority						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
Shareholders	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Labour unions	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Employees	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Customers	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Dealers and distributors	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Society at large	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Government & governmental agencies	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Preferred suppliers	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Other (non-preferred) Suppliers	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Ecological pressure groups	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Providers of debt capital	Five years ago	1	2	3	4	5	6	7	1	2	3	4	5	6	7
	At this moment	1	2	3	4	5	6	7	1	2	3	4	5	6	7

10. On a scale of 1 to 7, to what extent are the non-executive directors on the board representatives of *specific* shareholders:

None 1 2 3 4 5 6 All 7

11. \*\* Are any of the non-executive directors on the board, representatives of some stakeholder such as banks, suppliers, customers, government, employees.

No [..] Yes Banks [..]  
 Suppliers [..]  
 Customers [..]  
 Government [..]  
 Employees [..]  
 Other [..]

Please specify .....

12. \*\* How often does the board of directors/supervisory board meet?

13. How many times a year does your company management hold a meeting, formal or informal, with your largest shareholders or their representatives? [Do not include board meetings, even those in which directors representing specific shareholders are present]

- a. Less than once a year [..]
- b. Once a year [..]
- c. Twice or three times a year [..]
- d. Four or more times a year [..]

14. \*\* How many times a year does your company management hold a meeting, formal or informal, with the following stakeholders?

	Banks	Suppliers	Customers	Government	Unions
Less than once a year					
Once a year					
Twice or three times a year					
Four or more times a year					

15. \*\* How often do others in your company, besides the chief executive and finance director, participate in the meetings with shareholders?

	Never participates						Participates in all
a. R&D director	1	2	3	4	5	6	7
b. Leading scientists and technologists of the firm	1	2	3	4	5	6	7
c. Other, please specify	1	2	3	4	5	6	7

16. To what extent do the (a) largest shareholders and (b) average shareholders of your company have an in-depth understanding of the general situation and the key technologies of the industry?

	Has/had no understanding						Have/had full understanding
<b>a. The general situation: profitability, capacity utilisation and market trends</b>							
1. Largest shareholder now	1	2	3	4	5	6	7
2. Largest shareholder 5 years ago	1	2	3	4	5	6	7
3. Average shareholder now	1	2	3	4	5	6	7
4. Average shareholder 5 years ago	1	2	3	4	5	6	7
<b>b. The nature of the key technologies and the way they are developing</b>							
1. Largest shareholder now	1	2	3	4	5	6	7
2. Largest shareholder 5 years ago	1	2	3	4	5	6	7
3. Average shareholder now	1	2	3	4	5	6	7
4. Average shareholder 5 years ago	1	2	3	4	5	6	7

17. On a scale of 1 to 7, to what extent do the largest shareholders and average shareholders of your company have an in-depth understanding of the following matters, and to what extent did they understand these matters five years ago

	Have/had no understanding						Have/had full understanding
<b>a. The company's financial and competitive position, and corporate strategy</b>							
1. Largest shareholder now	1	2	3	4	5	6	7
2. Largest shareholder 5 years ago	1	2	3	4	5	6	7
3. Average shareholder now	1	2	3	4	5	6	7
4. Average shareholder 5 years ago	1	2	3	4	5	6	7
<b>b. The company's short-term technology strategy, including products due for launch within the next two years</b>							
1. Largest shareholder now	1	2	3	4	5	6	7
2. Largest shareholder 5 years ago	1	2	3	4	5	6	7
3. Average shareholder now	1	2	3	4	5	6	7
4. Average shareholder 5 years ago	1	2	3	4	5	6	7
<b>c. The company's longer-term technology strategy, including products more than two years from launch</b>							
1. Largest shareholder now	1	2	3	4	5	6	7
2. Largest shareholder 5 years ago	1	2	3	4	5	6	7
3. Average shareholder now	1	2	3	4	5	6	7
4. Average shareholder 5 years ago	1	2	3	4	5	6	7
<b>d. The quality and competence of the current top management team</b>							
1. Largest shareholder now	1	2	3	4	5	6	7
2. Largest shareholder 5 years ago	1	2	3	4	5	6	7
3. Average shareholder now	1	2	3	4	5	6	7
4. Average shareholder 5 years ago	1	2	3	4	5	6	7

18. Does 'Insider-Dealing' [or other] legislation represent a real obstacle in explaining to shareholders the work on innovation taking place in your company?

	Represents no obstacle at all						Represents real obstacle
	1	2	3	4	5	6	7
1. Largest shareholder							
2. Average shareholder							

19. \*\* Is your main priority to maximise shareholder value, if necessary at the expense of the interests of other stakeholders?

	We always insist on balancing the interests of shareholders with those of other stakeholders						We give complete priority to shareholders' interests
	1	2	3	4	5	6	7
Now							
5 years ago							

20. How far does the need for secrecy represent a real obstacle in explaining to shareholders the work on product innovation taking place in your company?

Represents no obstacle at all							Represents a real obstacle
1	2	3	4	5	6	7	

21. \*\* To what extent are the main shareholders of your firm active in the following areas, and how was the situation in these respects 5 years ago?

	Show no interest						Routinely insists on full explanation and expects the last word on the matter
<b>a. Influencing general strategy (incl. major mergers and acquisitions)</b>							
Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7
<b>b. Influencing the remuneration system of top management</b>							
Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7
<b>c. Influencing the selection of top management</b>							
Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7

22. \*\* How far would you agree that the following statement is true for your firm: "The nature of the relationship with shareholders leads to less resources going to product innovation than would be optimal for long-term shareholder value?"

	Strongly disagree						Strongly agree
	1	2	3	4	5	6	7
Now							
5 years ago							

23. \*\* In the last three years, has your company carried out a major restructuring operation which involved dismissing a substantial number of employees?

[..] Yes → Please answer question 23a  
 [..] No → Please answer question 23b

23a.\*\* In carrying out the restructuring operation, what was the influence of the following considerations on the strategy you followed at that time?

23b.\*\* If it seemed to the top management that the firm could gain in profit over the next three years by a strategy which involved dismissing a substantial number of employees, which of the following considerations would weigh against this, and how strongly?

	Did/would not have any influence						Did/would have a major influence
	1	2	3	4	5	6	7
Problems of conscience: inner feeling of responsibility to the employees	1	2	3	4	5	6	7
Social position in the local community would make it difficult	1	2	3	4	5	6	7
Would throw away skills which are likely to be valuable and thus in the long run might be self-defeating	1	2	3	4	5	6	7
Would damage the co-operative relationship between employees and management and in the long run be self-defeating	1	2	3	4	5	6	7
The union would react by a damaging strike or other industrial action	1	2	3	4	5	6	7
The workers would obstruct it by using their powers under co-determination	1	2	3	4	5	6	7
Effectively blocked by our legal obligations to the workforce	1	2	3	4	5	6	7
Financial interests of shareholders	1	2	3	4	5	6	7
Credibility towards providers of debt (banks)	1	2	3	4	5	6	7

24.\*\* What percentage of your expenditure for innovation was financed using the following sources?

1. Equity capital (.....)
2. Self financing (.....)
3. Medium or long-term bank loan (.....)
4. Financing with a lower than the market interest rate (.....)
5. National programmes of support (.....)
6. European programmes of support (.....)
7. Regional programmes of support (.....)
8. Fiscal reductions (.....)
9. Customers (.....)
10. Other \_\_\_\_\_ (.....)

25.\*\* If your firm does not utilize bank loans to finance innovation expenditures, please explain why:

1. We do not need external sources of finance
2. The interest rate is too high
3. We should have provided excessive collateral
4. Other \_\_\_\_\_

26.\*\* In a scale 1 to 7, what is in your opinion the understanding of banks of your market and of the technology employed in your products?

None	1	2	3	4	5	6	Very high
	1	2	3	4	5	6	7

27.\*\* In a scale 1 to 7, how do you define your relationship with the suppliers (not of CNC)?

Close	1	2	3	4	5	6	Loose
	1	2	3	4	5	6	7
Long-term	1	2	3	4	5	6	Short-term
	1	2	3	4	5	6	7

28.\*\* In a scale 1 to 7, how do you define your relationship with the suppliers of CNC?

Close	1	2	3	4	5	6	Loose
	1	2	3	4	5	6	7
Long-term	1	2	3	4	5	6	Short-term
	1	2	3	4	5	6	7

29.\*\* In a scale 1 to 7, how do you define your relationship with the customers?

<b>Close</b>						<b>Loose</b>
1	2	3	4	5	6	7
<b>long-term</b>						<b>short-term</b>
1	2	3	4	5	6	7

**Section 2**

**DEFINITIONS**

**Product innovation:** The introduction of a good or service which (for the firm) is new or substantially improved.

**Process innovation:** The introduction of a new means of production which (for the firm) is new or substantially improved.

**\*\*Please answer only the questions that apply to your firm\*\***

1. Name of Company.....
2. Sector of activity.....
3. Position of person filling in the questionnaire.....
4. How long have you been in this position?.....
5. How long have you been in the company?.....
  
6. Approximate number of employees working on Research and Development more than 50% of their time.....
  
7. R&D expenditure  
     1997..... 1998..... 1999.....

8. On a scale of 1 to 7, indicate the importance of different types of expenditure *on product innovation* in previous 12 months

	None						A major element of product innovation expenditure
	1	2	3	4	5	6	7
a) Research	1	2	3	4	5	6	7
b) Dev. & Design	1	2	3	4	5	6	7
c) Marketing & Sales	1	2	3	4	5	6	7
d) Training	1	2	3	4	5	6	7
e) Fixed capital	1	2	3	4	5	6	7

9. On a scale of 1 to 7, indicate to what extent is the research and development work for your *product* innovations done in-house? (Joint ventures should be put in the middle of the scale.)

All the R&D work for product innovation is done outside the firm							We rely entirely on in-house activities on in-house activities
	1	2	3	4	5	6	7
	1	2	3	4	5	6	7

10. How many R&D units or laboratories does your company have? If you only have one please go to question 12.....

11. On a scale of 1 to 7 mark the present and ideal level of interaction among the different R&D units of your company.

	None						Very High
Present level of interaction	1	2	3	4	5	6	7
Ideal level of interaction	1	2	3	4	5	6	7

12. On a scale of 1 to 7 what is the degree of interaction between the following different functions in relation to product innovation; and what should it ideally be in such a business as yours? (please tick 'Not Applicable' if your firm is not structured in this way)

	Not applicable	None					Very high
<b>1. Between Marketing e R&amp;S</b>							
Present level		1	2	3	4	5	6
Ideal level	[...]	1	2	3	4	5	6
<b>2. Between Production &amp; R&amp;S</b>							
Present level		1	2	3	4	5	6
Ideal level	[...]	1	2	3	4	5	6
<b>3. Between Research &amp; Development (if separate)</b>							
Present level		1	2	3	4	5	6
Ideal level	[...]	1	2	3	4	5	6
<b>4. Among different product divisions</b>							
Present level		1	2	3	4	5	6
Ideal level	[...]	1	2	3	4	5	6
<b>5. Among different geographical divisions</b>							
Present level		1	2	3	4	5	6
Ideal level	[...]	1	2	3	4	5	6

13. On a scale of 1 to 7 what is the degree of interaction with the following in relation to product innovation; and what should it ideally be in such a business as yours? (For customers we are not concerned with retailers, wholesalers or households; where these are the only important customers please tick Not Applicable.)

	Not applicable	None					Very high
<b>1. Firm and its customers</b>							
Present level		1	2	3	4	5	6
Ideal level	[..]	1	2	3	4	5	6
<b>2. Firm and its suppliers</b>							
Present level		1	2	3	4	5	6
Ideal level	[..]	1	2	3	4	5	6
<b>3. Firm and its competitors</b>							
Present level		1	2	3	4	5	6
Ideal level	[..]	1	2	3	4	5	6

If at b) (relationship with the suppliers) you answered 1,2 or 3, this is because:

- a) Secrecy is too important and therefore we only buy very simple parts from our suppliers.
- b) We find difficulties in trusting them.
- c) They do not do research.
- d) Other.....

On average, how much time does it take to bring a product innovation to market - from initial conception to launch?

Incremental change in existing product .....

Clearly new product.....

14. Considering the long-term interests of shareholders, how far would you agree with the following statement: "Not enough time and money is put into product innovation"?

Thoroughly disagree							Thoroughly agree
1	2	3	4	5	6	7	

15.a. If your answer to question 16 is 5, 6 or 7, is this because:

- a. These projects will not pay back soon enough [..]
- b. The target/hurdle rate of return is set too high [..]
- c. There is not enough funding/staff for exploratory work [..]
- d. There is not enough funding for R&D overall [..]
- e. There is not enough funding put into launching new products and building up their market share [..]
- f. There are a number of different divisions or profit centres which would have to co-operate and are unwilling to do so. [..]
- g. Other, please specify..... [..]

16. How has the use and importance of financial performance criteria in the selection and continuation of product innovation projects changed in the last 5 years?

Diminished substantially	Diminished	No change	Gone up	Gone up substantially
1	2	3	4	5

17. Which of the following do you count on to protect your product innovations from competitors? Please indicate their importance now and five years ago.

	Not used/negligible					Very important	
<b>1. Patents on products</b>							
Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7
<b>2. Patents on processes</b>							
Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7
<b>3. Copyright</b>							
Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7
<b>4. Your firm's specific knowledge and expertise</b>							
Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7

5. Complementary assets (eg: capital investment, distribution network, brand image)

Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7

6. Secrecy

Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7

7. Long-term contracts

Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7

8. Other, please specify \_\_\_\_\_

Now	1	2	3	4	5	6	7
5 years ago	1	2	3	4	5	6	7

18. What percentage of your turnover is from products innovated in the last three years?.....%

19. On a scale from 1 to 7, to what extent do you consider product innovation in your industry to be more or less radical compared to five years ago?

Substantially less radical							Substantially more radical
1	2	3	4	5	6	7	

20. On a scale from 1 to 7, to what extent do you consider product innovation in your firm to be more or less radical relative to (a) that of other national firms; (b) firms abroad in your industry?

	Much less radical						Much more radical
National firms	1	2	3	4	5	6	7
Firms abroad	1	2	3	4	5	6	7

21. If your firm is working with radically new technologies what is their main source? (tick more than one if appropriate)

- These technologies are developed in- house [..]
- These technologies are developed jointly with academic institutions [..]
- These technologies are developed in collaboration with other firms:
  - Suppliers [..]
  - Rivals [..]
  - Customers [..]
  - Others..... [..]
- These technologies are brought in through mergers and acquisitions [..]

22. Is your firm working on leading-edge technologies that are unlikely to affect market share in the next 5 years?

- Is working on these technologies [..]
- Is working on them but makes sure that they are a very small proportion of the overall assets (activities) of the firm [..]
- We are making a substantial commitment in collaboration with other firms [..]
- We are making a substantial commitment on our own [..]
- Other, please specify..... [..]

23. Have you ever received public funding for innovation?

- 1) No, we have never asked for it.
- 2) No, we would have like to apply but the burocratic procedures are too long.
- 3) No, we apply for it but we never received any.
- 4) Yes, but rarely.
- 5) Yes, very often.
- 6) Other, please specify.....

**Section 3**

**DEFINITIONS**

**Product innovation:** The introduction of a good or service which (for the firm) is new or substantially improved.

**Process innovation:** The introduction of a new means of production which (for the firm) is new or substantially improved.

*\*\* Please answer only the questions that apply to your firm \*\**

1. Name of Company.....
2. Sector of activity .....
3. Position of person filling in the questionnaire.....
4. How long have you been in this position?.....
5. How long have you been in the company?.....
6. What is the number of employees in your company (give full time and part time if possible)
  - .....(full time)
  - ..... (part time)

**7. Does your company currently have systems for relating pay to the financial performance of the company for following sections of the workforce and did it have such measures 5 years ago?**

	Yes	No
<b>Top management</b>		
Now	[..]	[..]
5 years ago	[..]	[..]
<b>Middle management</b>		
Now	[..]	[..]
5 years ago	[..]	[..]
<b>Key Innovation workers(eg: scientists, senior programmers in IT)</b>		
Now	[..]	[..]
5 years ago	[..]	[..]
<b>All the workforce</b>		
Now	[..]	[..]
5 years ago	[..]	[..]

**8. What is the average percentage of the total wage that is variable for the following categories of employees now and five years ago?**

<b>Top management</b>	
Now	.....%
5 years ago	.....%
<b>Middle management</b>	
Now	.....%
5 years ago	.....%
<b>Key Innovation workers (eg: scientists, senior programmers in IT)</b>	
Now	.....%
5 years ago	.....%
<b>All the workforce</b>	
Oggi	.....%
5 anni fa	.....%

**9. Does your company have a system of share options?**

[..] Yes                      [..] No

If the answer is NO, please go to question 10.

9.a. Has your company introduced share options to remunerate the following sections of the workforce and did it have such measures 5 years ago?

	Yes	No
<b>Top management</b>		
Now	[..]	[..]
5 years ago	[..]	[..]
<b>Middle management</b>		
Now	[..]	[..]
5 years ago	[..]	[..]
<b>Key Innovation workers(eg: scientists, senior programmers in IT)</b>		
Now	[..]	[..]
5 years ago	[..]	[..]
<b>All the workforce</b>		
Now	[..]	[..]
5 years ago	[..]	[..]

10. Are there any incentives for the following employees to come up with innovative suggestions?

	Yes	No
Production	[..]	[..]
Sales and marketing	[..]	[..]

11. How many years does the average employee in the following categories stay with the firm?

	0-2	2-5	5-10	More than 10
<b>a. Senior management</b>	[..]	[..]	[..]	[..]
<b>b. Research, development and design/IT development</b>				
Graduate scientists and technologists	[..]	[..]	[..]	[..]
Technicians/non-graduate programmers	[..]	[..]	[..]	[..]
<b>c. Production</b>				
Graduate engineers and technologists	[..]	[..]	[..]	[..]
Technicians/ manual workers	[..]	[..]	[..]	[..]
Direct production operatives	[..]	[..]	[..]	[..]
<b>d. Sales, marketing and after-sales service</b>				
Sales and marketing managers	[..]	[..]	[..]	[..]
Sales representatives	[..]	[..]	[..]	[..]
Service engineers	[..]	[..]	[..]	[..]



19. In a scale from 1 to 7, what is the role of the education system in preparing the students to work in this sector?

None. The preparation of the students is too general and training takes place mainly within the firm

1

2

3

4

5

6

Very good. The students are very qualified

7

## Section 4

### DEFINITIONS

**Product innovation:** The introduction of a good or service which (for the firm) is new or substantially improved.

**Process innovation:** The introduction of a new means of production which (for the firm) is new or substantially improved.

**\*\* Please answer only the questions that apply to your firm \*\***

1. Name of Company.....
2. Nationality of Company.....
3. Name of parent company.....
4. Nationality of parent company.....
5. Sector of activity.....
6. Position of person filling in the questionnaire.....
7. How long have you been in this position?.....
8. How long have you been in the group?.....
9. And in the subsidiary?.....
10. Number of employees of this subsidiary.....
11. Gross Turnover of this subsidiary  
1997..... 1998..... 1999.....
12. What proportion of this turnover is sold within the group to which you belong?  
.....
13. Is your parent company's shareholding in your company 100%, or less?  
100% [...] Less than 100% .....%
14. As a profit centre does your company report directly to headquarters, or is there an intermediate level to which you report – i.e. are you a subsidiary of a subsidiary?  
We report directly to HQ [...] We report to an intermediate level [...]

### Relationship with the HQ

15. How many times per year are there face-to-face meetings between the headquarters and the management of your company?.....
16. How many times per year are there face-to-face meetings between the intermediate level and the management of your company?.....
17. On a scale of 1 to 7, to what extent would you describe the activity of your profit centre as part of the core activities of the group?

	Totally peripheral						Right at the core
	1	2	3	4	5	6	7
18. What is the degree of autonomy of the subsidiary from the Headquarters in the following functions, and what was it five years ago?							
	Entirely provided by the parent						The company raises its funds independently 7
Finance*	1	2	3	4	5	6	7
	Entirely carried out by headquarters						Independent function of the company
Marketing & Sales	1	2	3	4	5	6	7
	Entirely carried out by headquarters						Independent function of the company
R&S	1	2	3	4	5	6	7
	*Degree of freedom to finance activities or to find funding for projects.						

19. If the subsidiary has its own R&D department or unit, what is the percentage of R&D directly financed by Headquarters, and what was it five years ago?

Financed NOW .....                      Financed five years ago .....

20. If some R&D for the subsidiary is (or can be) carried out by the central R&D department, to what extent does the subsidiary have to pay for this and does it have discretion to decide how much is done for it; and what was the situation five years ago?

Does not have to pay						Has to pay all
1	2	3	4	5	6	7
Has no discretion						It is free to decide
1	2	3	4	5	6	7

21. The following list contains performance measures. Please indicate for each measure how important it is in Headquarters' final evaluation of the overall performance of your subsidiary. The following list contains performance measures. Please indicate for each measure how important it is in Headquarters' final evaluation of the overall performance of your subsidiary.

	Totally unimportant						Of decisive importance
	1	2	3	4	5	6	7
1. Production efficiency	1	2	3	4	5	6	7
2. Changes in net profit	1	2	3	4	5	6	7
3. Employee satisfaction	1	2	3	4	5	6	7
4. Market share	1	2	3	4	5	6	7
5. Adherence to cost estimates	1	2	3	4	5	6	7
6. Time to market of new products	1	2	3	4	5	6	7
7. Economic value added (eg. EVA, CFROI)	1	2	3	4	5	6	7
8. Ability to rapidly renew products and processes	1	2	3	4	5	6	7
9. Net profit (corporate overhead included)	1	2	3	4	5	6	7
10. Active support for corporate strategy	1	2	3	4	5	6	7
11. Quality of final products and services	1	2	3	4	5	6	7
12. Adherence to the budget line items	1	2	3	4	5	6	7
13. Return on Investment (ROI) or on (Net) Assets (ROA)	1	2	3	4	5	6	7
14. Customer satisfaction	1	2	3	4	5	6	7

22. On a scale of 1 to 7, how tight do you perceive the financial control from Headquarters, in terms of how they respond to a failure to meet financial targets; how tight do you think financial control from Headquarters *should* be?

	Very loose (any excuse will do)						Very strict (no excuses)
1. How tight do you perceive financial control today?	1	2	3	4	5	6	7
2. How tight do you think financial control <i>should</i> be?	1	2	3	4	5	6	7

23. On a scale of 1 to 7, how tight do you perceive the non-financial control from Headquarters, in terms of how they respond to a failure to meet financial targets; how tight do you think non- financial control from Headquarters *should* be?

	Very loose (any excuse will do)						Very strict (no excuses)
1. How tight do you perceive non-financial control today?	1	2	3	4	5	6	7
2. How tight do you think non-financial control <i>should</i> be?	1	2	3	4	5	6	7

24. To what extent do the following tend to reduce your subsidiary's expenditure of money and labour on product innovation; to what extent did they reduce it five years ago?

	No effect/not relevant						Reduce very severely
1. Tightness of financial targets	1	2	3	4	5	6	7
2. Remuneration by profit centre results	1	2	3	4	5	6	7
3. Lack of centre's attention to/understanding of the underlying non-financial performance of the company	1	2	3	4	5	6	7
4. Difficulty of getting funding for product innovation	1	2	3	4	5	6	7

### Appendix 3. Regional map of Italy



## Appendix 4. The Swedish system of corporate governance

### A3.1 Ownership, control, and the most recent developments

The Swedish and the Italian systems of corporate governance differ in several respects but present also a few similarities. They are both insider systems even though the Swedish is much closer to the outsider end of the continuum than the Italian one. Both systems are characterised by a high concentration of ownership and control of listed firms in the hands of a few families, even though the percentage of ownership in the hands of individuals has in Sweden progressively decreased since the 1970s (See Table A3.1). This, however, has not reduced the concentration of control as the widespread use of dual class shares<sup>1</sup> allows keeping control with a small percentage of shares.

Table A3.1 Ownership of quoted shares 1983-1994. Per cent

	Insurance companies	Mutual funds	NP-funds	Investment companies	Non-financial enterprises	Individuals	Other domestic owners <sup>1</sup>	Foreign owners
1983	11	5	2	16	16	30	12	8
1986	14	6	5	13	17	25	13	8
1989	15	10	5	8	20	20	15	7
1991	15	9	6	11	22	18	13	8
1992	15	9	6	10	20	16	12	12
1993	13	10	4	7	17	17	12	21
1994	13	10	4	6	12	17	12	28
1995	13	9	4	7	9	15	12	30

1. Public sector, banks, foundations.  
Source: OECD (1997b).

As a consequence of the concentration of ownership (or at least of the shares with voting power), as much as in Italy, the market for corporate control in Sweden is to a large extent located outside the ordinary stock market. The stock exchange in Sweden is however much more liquid and developed than the Italian one and the percentage of shares in the hands of financial institutions is much higher than in Italy. Since the 1970s there has been an emergence of investment companies which, apart from operating as venture capitalists, tend to establish strategic long-term minority positions in a few publicly-traded operating companies and to play an active

<sup>1</sup> Swedish corporations can issue shares with different voting rights with a maximum ratio of 10:1 between A-class and B-class shares.

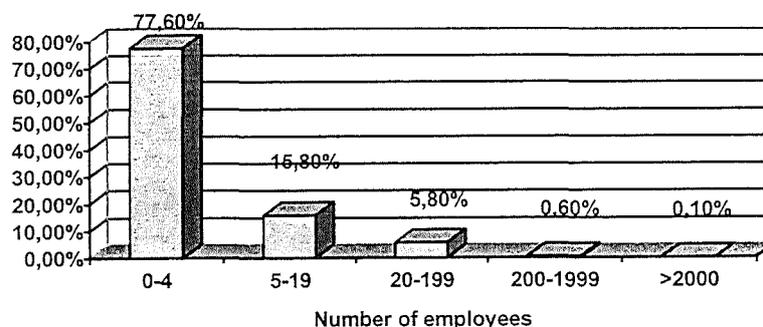
role in the corporate governance of these firms. Their importance has however decreased during the 1990s, with the penetration of foreign investors.

Public ownership of business sector companies has never been extensive in Sweden and during the 1990s the process of privatisation has further reduced this presence.

As for the role played by banks, we need to go back to the fall of the Kreuger's empire in 1932, when several banks were heavily damaged. In that occasion, the Company Act and bank legislation were reformed. Since then banks have no longer been allowed to own shares except to protect bad debts and for a limited period. Nevertheless some of them set up investment companies, transferred their industrial shares to those holding companies and offered to their own shareholders the shares of the investment companies. In addition, the industrial firms, whose shares were in large part in the hands of the investment companies, were also customers of the banks. During this period the so-called "bank spheres" were also established. They are characterised by managerial cooperation, mutual membership in Boards of Directors and support in internationalisation effort, resembling in this way the German model. Within the spheres, "banks provided financial problem solving and to a considerable extent, industrial leadership, with a long-term perspective" (Adolfsson et al.,1999).

Like Italy, Sweden is dualistic in terms of firms' size, with very few large firms, and a large number of small firms (See Figure A3.1).

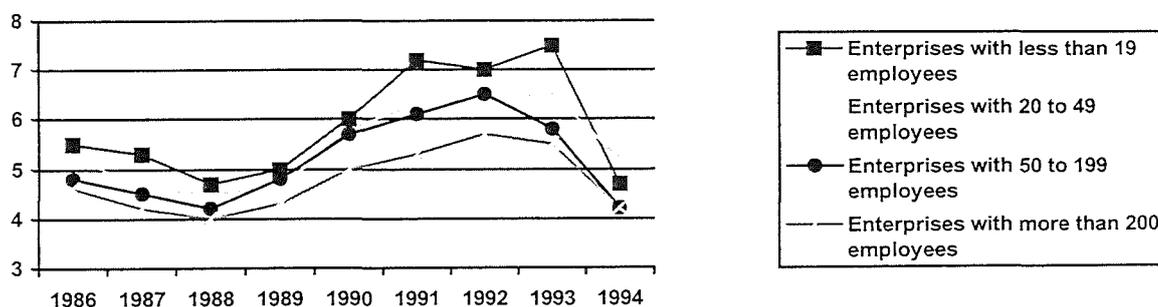
Figure A3.1 Share of enterprises, by enterprise size (number of employees)



Source: OECD (1997b).

Small firms present in Sweden the same financial problems as they do in Italy. This is for several reasons. Firstly, the close link between the trade union movement (see below) and the Social Democratic party, the governing party for most of the post-war period, ensured that the results of the collective bargaining of the confederations of employers and employees often translated into national acts or regulations, leaving small companies little discretion as to contractual and work-time regulations. Secondly, industrial policy in Sweden has always supported large enterprises. For example, competition policy focused on promoting economies of scale and the tax system, capital market regulations and the foreign direct investment regime have combined to favour large capital-intensive enterprises (OECD, 1997b). Thirdly, before the financial market deregulations (completed in 1989), credit was allocated to areas of high political priority, such as housing finance. Consumer credit and lending for business finance was restricted in order to maintain overall credit growth within ceilings considered consistent with macroeconomic objectives. The allocation of loans under credit rationing favoured established entities, generally larger companies, as these had a long-standing relationship with financial institutions (“spheres”) and were able to furnish collateral for loans granted. In addition, the cost of funds for medium- small firms has always been much higher than that of large firms due to the higher risk they embody (the bankrupt rates are much higher among small-medium firms than among larger ones)<sup>2</sup> (See Figure A3.2).

Figure A3.2 Cost of funds, per cent



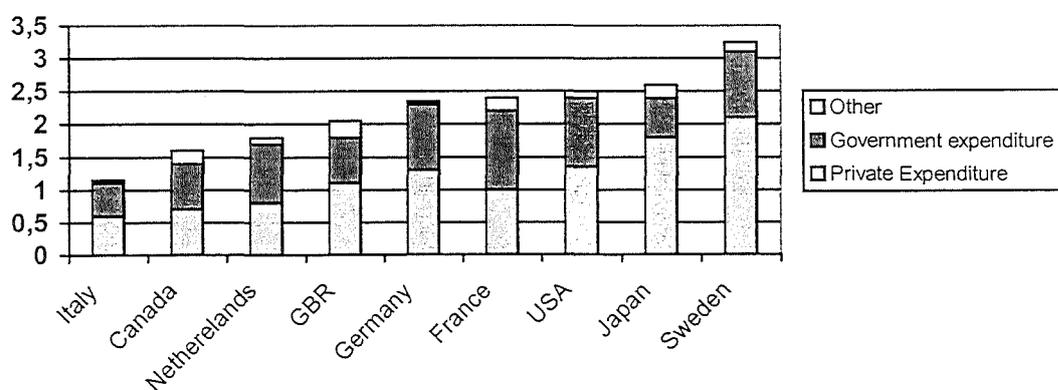
Source: OECD (1997b).

<sup>2</sup> Since the mid-1980s, several public programmes have been directed towards small and medium-sized enterprises, due to the failure of the capital market to make adequate financial provisions for this segment of the economy. Now Sweden offers a wide range of support with respect to investment, exports, technology, R&D, management and education, consultancies and environment issues. Overall there exist 140 types of subsidies with an additional 110 available from the EU.

The low availability of funds for SMEs is reflected in the difficulty that small firms display in reaching a larger dimension<sup>3</sup> and a high level of R&D spending. In 1994, 85% of the total private R&D spending was undertaken by companies with more than 500 employees, thanks to the ability of large firms to appropriate the benefits of R&D expenditures through economies of scale.

The strong development undergone by the venture capital market in the last few years might change this situation. In fact, the Swedish venture capital market now ranks third in the world when it comes to investments, after the US and UK. The amount invested by VC- firms in 1999 was over 11 billion SEK, representing 0,57% of the GDP, which is about double the European average. Sweden is also the leader in investing in start up companies, with 58% of all investments going to the early stages of activity. As for the sectors that have attracted most of the investments, the leading industry is telecom (followed by computer and electronics) if the number of investments is considered, and industry products and services, if the amount invested is considered (SWCA, 2000).

Figure A3.3 R&D expenditure by financial sources. Per cent of GDP. 1994



Source: OECD (1997b).

In comparison with the other countries, Sweden presents a very high intensity of R&D relative to GDP. As it can be seen in Figure A3.3, in 1994 Sweden spent in R&D, 3.3% of GDP. In the same year, the average of the OECD countries was 2.3% and the percentage spent by the US was 2.5%. The private business sector accounts

<sup>3</sup> The survival rate of new firms after three years is only 66%, after 5 years 60% and after 10 years 40%. However, the average employment of 10-years old firms is only 3 people.

for the largest part (71.7%), whereas the level of R&D expenditures by the government is much lower, accounting for less than 30% of total expenditures.

Notwithstanding the high intensity of R&D expenditure, a very low share of the activities of Swedish firms are high-tech with some notable exceptions such as motor vehicle and instruments production. Sweden and Italy are at the opposite ends of the scale with regard to R&D expenditure relative to GDP. However, the share of manufacturing value added by industry is rather similar in the two countries with more than 50% of the value added being produced by low-tech activities and less than 20% produced by high-tech activities (See Table A3. 2).

**Table A3. 2 Share of manufacturing value added by industry (1993)**

	Sweden	USA	Japan	Germany	France	Italy	UK	Canada	OECD
High tech	16.8	24	21.4	20.1	18.6	13.7	22	12.3	20.6
Medium-tech	29.7	30.3	34.3	33.9	27.8	23.7	30.4	34.7	30.9
Low-tech	53.5	45.7	44.3	46	53.6	62.6	47.6	53	48.5

Source: OECD (1997b).

### **A3. 2 The Swedish model**

“Broadly conceived, the Swedish model comprised not only a structure of union-management relations but also a pattern of economic and social policy” (Locke et al., 1995, p.263). In the beginning of the 1900s in fact, state, capital and labour formed a coalition that in less than a century was to bring Sweden among the most advanced economies in the world.

The Swedish Confederation of Trade Unions (LO) and the Swedish Employers’ Confederation (SAF) were formed respectively in 1898 and 1902. That period was characterised by a very high frequency of strikes and lockouts. However, the threat that disputes within the labour market could end up in the mutual extinction was very real and both parties recognised each other as negotiating partners for the sake of self-preservation. The first agreements granted the employers the management of labour organisation, pay and control system within companies and the unions the administration of all the issues concerning working hours, pay and insurance, and problems of an overall character. Since the establishment of such coalition, the unions have always been very supportive of technical advances and efficiency measures as these are considered as instruments creating opportunities to

improve profits in trade and industry, which also benefited workers in the form of increased wages and higher living standards. In 1938, the Saltsjöbaden Agreement was signed. This gave the State the duty of taking responsibility for unemployment, and SAF and LO the opportunity to spend their energies in maintaining efficient and friction free production. This agreement increased the degree of collaboration between capital and labour and the respect of what was called the collective wage agreement. The latter ensured that even in industries exposed to heavy competition or where profits were poor, the employees were to have the same wage increase as successful industries. This had immense effects on the Swedish economy as the least efficient enterprises were rapidly eliminated from the market, and only the best, more innovative and efficient ones were left.

During the 1960s, the negative side of the Swedish model, namely the extensive use of Taylorism (the fragmentation of work into simple, narrowly defined, closely controlled tasks, readily performed by highly interchangeable workers) caused a progressive reduction in the degree of collaboration between capital and labour. Several strikes broke out. During the 1970s, the unions obtained from the Social Democratic Party the approval of a series of measures that would have improved the working conditions on the shop floor, the most famous ones being the Co-determination Act of 1976<sup>4</sup> and the one that instituted the Employee Investment Funds.

At the beginning of the 1990s, Sweden underwent a major economic crisis and the state made profound cuts in the social welfare system. According to several authors this has destroyed the so-called Swedish model. Persson (1997, p.131), however, argues that the Swedish model is just entering a new phase. It is worth reporting his words. "I believe that making such a claim is a great exaggeration: in Swedish working life there exists a consensus which remains deeply rooted at all levels of Swedish society, whatever the reductions in the social safety-net. [...] Today, there is greater interest from the management of companies in introducing various types of Management By Objectives (MBO), combined with a greater element of individual wage setting. Often ideas from other countries are adopted. There has been interest in the steel industry in investigating the high degree of effectiveness to be found in mini-mills, at which, many writers claim, trust and commitment between

---

<sup>4</sup> The law granted the Unions the right to negotiate agreements extending joint determination to any workplace issues, including hiring and firing, work assignment and disciplinary matters.

management and labour also prevail. The basic feeling still exists in Sweden that decisions should largely be taken in agreement, even if management achieves its objectives in the end. This feeling creates an interest in organisational models involving trust and commitment”.

There is now a certain amount of room for individual responsibility and that gives the worker a feeling of confidence. Employees know that the Swedish model has made it impossible for employees to be fired without a reason and that even if they were to be made redundant, the system of social security would ensure that they would not fare too badly. Therefore they dare to take responsibility, make mistakes, discuss and cooperate with the company management with no fear (Persson, 1997).

### **A3.3. The relationship with other stakeholders**

The major Swedish firms have always developed their strength from an early customer orientation, which often took the form of cooperation. For example companies like ASEA in electricity and Ericsson in telephones cooperated closely with the state authorities in charge of these areas in order to solve problems, increase the technological level and find new solutions. There is also a strong tendency to cooperate with industrial customers in general and a limited focus on consumer goods, with the exception of IKEA, the do-it-yourself furniture company (Adolfsson et al, 1999).

### **Conclusions**

The Swedish system of corporate governance is rather similar to the Italian one even if the Swedish system is shifting at a much faster speed towards the outsider model. Both systems appear to have a good degree of *firm specific perceptiveness* of those who finance innovation. However, the higher liquidity and development of the Swedish stock exchange makes it more likely that at least among the listed firms the number of outsider shareholders is much higher in Sweden than in Italy. This is very important if one remembers that large firms account for the largest part of R&D carried out in the country. At the same time, large firms also belong to the bank spheres, which appear to have a very high degree of *firm-specific perceptiveness*.

The role played by small firms in innovation is basically non-existent but the strong support that these firms have been obtaining in the last few years and the recent development of the venture capital market might change the situation in the near future.

The degree of *industry specific expertise* appears higher than the Italian one due to the much stronger development of the venture and private capital markets and their investments in this type of expertise.

The degree of *inclusion* of customers, suppliers and employees appears very high. Employees, in particular, seem to have many more incentives than in Italy to invest in firm-specific skills and to actively contribute to the innovation process. In fact, in Italy, job protection is not accompanied by a degree of delegation of responsibilities as high as in Sweden and the employees do not have many incentives in investing in their own skills and in actively participating in the innovation process.

## Bibliography

- Abernathy W. and K. Clark, (1985): "Innovation: Mapping the winds of creative destruction", *Research Policy*, 14, p.3-22.
- Abernathy W. and J. Utterback, (1978): "Patterns of industrial innovation" in *Technology Review*, June-July, p.40-47.
- Adolfsson P., U. Ask, U. Holmberg and S. Jönsson, (1999): *Corporate Governance in Sweden: a Literature Review*, report submitted to the European Commission in 1999.
- Aifi, (1999): *Yearbook 1999: Venture Capital and Private Equity in Italy*, Milan.
- American Machinist, various issues.
- Aoki M., (1998): "An information theoretic approach to comparative corporate governance", Paper presented at the conference on "Corporate Governance" held in Sitgas, Spain, October 23-4.
- Aoki M., B. Gustafsson, and O.E., Williamson, (1990): *The firm as a nexus of treaties*, Sage Publications, London.
- Archibugi D. and M. Pianta, (1996): "Innovation surveys and patents as technology indicators: the state of the art", ch.1 in OECD.
- Archibugi D., R. Evangelista, G. Perani and F. Rapiti, (1996): "L'innovazione nelle imprese italiane: un'analisi dei risultati dell'indagine Istat", *Economia e Politica Industriale*, 89.
- Arrow K., (1962): "Economic welfare and the allocation of resources for invention", in Nelson R.R. (ed.): *The rate and direction of inventive activity*, Princeton: Princeton University Press.
- Balconi M., A. Moisello and M. Mutinelli, (1998): "La fine della polarizzazione: le caratteristiche e la crescita dei gruppi medi italiani", *Economia e Politica Industriale*, n. 97, 25-77.
- Barca F., (1995): "On Corporate Governance in Italy: Issues, Facts, and Agency", Manuscript, Bank of Italy, Rome.
- Barca F. and S. Trento, (1997): "State ownership and the evolution of Italian corporate governance", *Industrial and Corporate Change*, vol.6, n.3, 533-559.

- Barca F., M. Bianco, L. Cannari, P. Cesari, C. Gola, C. Manitta, G. Salvo and L.F. Signorini, (1994a): *Assetti proprietari e mercato delle imprese*, vol.I, Il Mulino.
- (1994b): *Assetti proprietari e mercato delle imprese*, vol.II, Il Mulino.
- (1997): *Storia del capitalismo italiano dal dopoguerra ad oggi*, Donzelli editore, Rome.
- Becht, M. and A. Röell, (1999): "Blockholdings in Europe: an international comparison", *European Economic Review*, vol.43, n.4-6, 1049-56.
- Berglöf E., (1997) "Reforming corporate governance: redirecting the European agenda", *Economic Policy*, n. 24, April, 93-123.
- Berglöf E. and E. Perotti, (1994): "The Governance Structure of the Japanese Financial Keiretsu", *Journal of Financial Economics*, vol.36, n.2, 259-284.
- Berglöf E. and E.L. von Tadden, (1999): "The changing corporate governance paradigm: implications for transition and developing countries", *OECD Working Paper*.
- Berle A. and G. Means, (1932): *The Modern Corporation and Private Property*, MacMillan, New York.
- Bianchi M., M. Bianco and L. Enriques, (1997): "Ownership, Pyramidal groups and separation between ownership and control in Italy", European Corporate Governance Network.
- Bianco M. and P. Casavola, (1999): "Italian corporate governance: effects on financial structure and firm performance", *European Economic Review*, vol.43, n.4-6, 1057-1069.
- Bianco M., P. Casavola and A. Ferrando, (1997): "Pyramidal groups and external finance: an empirical investigation", Servizio studi Banca d'Italia.
- Binks M. and C.T. Ennew, (1996): "Growing firms and credit constraint", *Small Business Economics*, vol.8, n.1, 17-25.
- Bird C. and M. Jelinek, (1990): "Dynamic Tension in Innovative, High Technology Firms: Managing Rapid Technological Change Through Organisational Structure" in Von Glinow M. and S. Mohram (Eds), *Managing Complexity in High Technology Organisations*, Oxford University Press.
- Blair M., (1995): *Ownership and Control: rethinking corporate governance for the 21<sup>st</sup> century*, Brookings Institute, Washington DC.

- (1996): *Wealth Creation and wealth sharing: a colloquium on corporate governance and investments in human capital*, Brookings Institute, Washington DC.
- (1999): *Employees and Corporate Governance*, Brookings Institute, Washington DC.
- Blair M. and L.A. Stout, (1999): "Response to Peter C. Konstant's 'Exit, voice and loyalty in the course of corporate governance and counsel's changing role'", *Journal of Socio-Economics*, 28.
- Bonato L., R. Hamauï and M. Ratti, (1991): *Come spiegare la struttura finanziaria delle imprese italiane?* Banca Commerciale Italiana, Collana Ricerche.
- Bond S., Harhoff D. and J.V. Van Reenen, (1999): "Investment, R&D and financial constraints in Britain and Germany", Institute for fiscal studies, Working paper, 95/05.
- Bound, J., Cummins, C., Griliches, Z., Hall, B.H. and A. Jaffe, (1984): "Who does R&D and who patents?", in Z. Griliches, ed. *R&D patents, and productivity*. Chicago, University of Chicago Press for the National Bureau of Economic Research.
- Braczyk H., P. Cooke and R. Heidenreich, (1998): *Regional Innovation System: the Role of Governances in a Globalised World*, London: University of London Press.
- Breschi S. and F. Malerba, (1997): "Sectoral Innovation Systems: Technological Regimes, Schumpeterian Dynamics, and Spatial Boundaries", in Charles Edquist (ed.), *Systems of Innovation: Technologies, Institutions and Organisations*, Chapter 6, London and Washington: Pinter, 130-56.
- Browne F. X., (1994): "Corporate finance: stylised facts and tentative explanations", *Applied Economics* n. 26, 485-508.
- Brunetti G. and F. Cescon, (1998): "Capital markets and corporate governance in Italian companies: a study of short-term pressures", in I.S. Demirag: *Corporate governance, Accountability in and Pressures to perform. An international study*, Jai Press Inc., 235-268.
- Brusco S., (1982): "The Emilian Model: Productive decentralisation and social integration", *Cambridge Journal of Economics*, vol.6, n.2, 167-84.
- Burgess R.G., (1982): *Field Research: a Sourcebook and Field Manual*, George Allen & Unwin, London.

- Buzzacchi L. and M.G. Colombo, (1994): "Gruppi di impresa e proprietà", *Politica Economica*, vol.10, n.2, 157-89.
- (1996): "Business groups and the determinants of corporate ownership", *Cambridge Journal of Economics* vol.20, n.1, 31-51.
- Buzzacchi L. and M. Pagnini, (1995): *I meccanismi di funzionamento dei circuiti interni dei capitali: un'indagine empirica del caso italiano*, mimeo.
- Buzzacchi L. and S. Paleari, (1996): "Wealth transfers in dual class recapitalisations with the rights method: the case of the Italian Stock market", Nota di lavoro, Fondazione Enrico Mattei.
- Cadbury A., (1992): *Report of the committee on the financial aspects of corporate governance*, Gee&Co Ltd, December.
- Cainarca G.C. and M. Colombo, (1991): *Tecnologia e organizzazione nell'automazione integrata della fabbrica*, Milan: MIP.
- Cainarca C., M. Colombo, and S. Mariotti, (1987): "Innovazione e diffusione. Il caso dell'automazione flessibile", *L'Industria*, vol.VIII, n.4, 533-574.
- CalPERS, (1998): *Corporate governance core principles & guidelines: the United States*, Sacramento CA.
- Camagni R. and M. Pattarozzi, (1989): "La diffusione territoriale di un'innovazione di processo e di prodotto: la robotica industriale in Italia", *L'Industria*, vol.X, n.3, 482-512.
- Capra L., N. D'Amico, G. Ferri, and N. Pesaresi, (1994): *Assetti proprietari e mercato delle imprese*, vol.III, Il Mulino.
- Caprio L. and A. Floreani, (1996): "Transfer of control of listed companies in Italy: an empirical analysis", Nota di lavoro, Fondazione Enrico Mattei.
- Carlsson B., (1989): "Small-scale industry at a crossroads: US machine tools in a global perspective", *Small Business Economics*, n.1, 21-38.
- Carlsson B. and R. Stankiewicz, (1991): "On the Nature, Function and Composition of Technological Systems", *Journal of Evolutionary Economics*, vol.1, n.2, 93-118.
- Carpenter R., Fazzari, S.J. and B.C. Petersen, (1994): "Inventory investment, internal finance fluctuations, and the business cycle", *Brooking Papers on Economic Activity*, vol.0, n.2, 75-122.
- Casper S., (1999): "Can high-tech industries prosper in Germany?", *Industry and Innovation*, vol.6, n.1, 5-24.

- Castellano C., (1984): "Il settore dell'automazione industriale", *L'Industria*, vol.V, n.2, 215-241.
- CER/IRS, (1993): *La trasformazione difficile*, Il Mulino.
- Chaponniere Y. Jr., (1990): *The World Machine Tool Industry: Technological Trends and Their Implications for Developing Countries*, PCT/UNIDO.
- Charkham J.P., (1994): *Keeping a good company*, Clarendon Press, Oxford.
- Cho Y.D., (1995): "Financial factors and corporate investment: a microeconomic analysis of manufacturing firms in Korea", Dphil thesis, University of Oxford.
- Cilona O. and M.Trona, (1993): "L'industria delle macchine utensili negli anni 90: mercati, innovazione e sistema delle imprese", *Economia e Politica Industriale*, n.77, 207-220.
- Clarkson M.B.E., (1994): *A risk based model of stakeholder theory*, The centre for corporate social performance and ethics, University of Toronto.
- CNR-NOMISMA, (1993): "Patterns of innovation in Italian industry", EIMS publication, n.3.
- Coase R., (1937): "The nature of the firm", *Economica*, vol.4, 386-405.
- Cohen W. and R. Levin, (1989): "Empirical studies of innovation and market structure", in R. Schmalensee and R.D. Willig (ed.) *Handbook of Industrial Organisation (Volume II)*, Chapter 18, Amsterdam: Elsevier.
- (1996): "A reprise of size and R&D", *The Economic Journal*, vol.106, n.437, 925-51.
- Cohen W., R. Levin, and D.C Mowery, (1987): "Firm size and R&D intensity: A re-examination", *Journal of Industrial Economics*, 35, p.543-563.
- Conti G. and G. Ferri, (1997): "Banche locali e sviluppo economico decentrato" in Barca et al., *Storia del capitalismo italiano dal dopoguerra ad oggi*, Donzelli editore, Rome.
- Creswell J.W., (1994): *Research Design: Qualitative & Quantitative Approaches*, Sage Publications, London.
- Critical Technologies Institute, (1994): *The Decline of the U.S. Machine-Tool Industry and Prospects for Its sustainable recovery*, Volume I, Santa Monica, CA, RAND.

- Critical Technologies Institute, (1994): *The Decline of the U.S. Machine-Tool Industry and Prospects for Its sustainable recovery*, Volume II, Santa Monica, CA, RAND.
- Dalton M., (1987): *Men who manage*, Garland Publishing, London.
- Dasgupta P. and P.A. David, (1994): "Toward a new economics of science", *Research Policy*, vol.23, 487-521.
- Debenedetti F., (1998): "L'obbligo di OPA non rafforza i piccoli azionisti", *Il Sole 24 Ore*, 29th January.
- Delmestri G., (1998): "Do all roads lead to Rome... or Berlin? The evolution of intra- and inter-organisational routines in the machine-building industry", *Organisation Studies*, 19/4, 639-665.
- Demirag I., (1996): "From common sense to short-termism" in Belcher A., et al.: *R&D Decisions*, Routledge, London.
- (1998): *Corporate Governance, Accountability and Pressures to Perform: An International Study*, Greenwich, USA: JAI Press.
- Demsetz H., (1983): "The structure of Ownership and the Theory of the Firm", *Journal of Law and Economics*, vol.26, n.2, 375-390.
- Demsetz H. and K. Lehn, (1985): "The Structure of Corporate Ownership: Causes and Consequences", *Journal of Political Economy*, vol.93, n.6, 1155-1177.
- Deveroux M.P. and F. Schiantarelli, (1990): "Investment, financial factors and cash flow from UK panel data", in G. Hubbard (ed.), *Information, Capital market and Investment*, Chicago, IL, University of Chicago Press.
- Donaldson T. and L. Preston, (1995): "The stakeholder theory of the corporation: concepts, evidence and implications", *Academy of Management Review*, vol.20, n.1, 65-91.
- Dosi, G., (1990): "Finance, innovation and industrial change", *Journal of economic behaviour and organisation*, vol.13, n.3, 299-319.
- Doudeyns M. and H. Edward, (1993): "Statistical Indicators of Innovation", *Economic Trends*, n.479, September, 112-23.
- Downey H.K. and R.D. Ireland, (1979): "Quantitative versus Qualitative: Environmental Assessment in Organisational Studies", *Administrative Science Quarterly*, vol.24, n.1, 630-637.

- Easterby-Smith M., R. Thorpe and A. Lowe, (1991): *Management Research: an Introduction*, Sage Publications, London.
- Edquist C., (1997): "Systems of Innovation Approaches – Their Emergence and Characteristics", in Charles Edquist (ed) *Systems of Innovation: Technologies, Institutions and Organisations*, Chapter One, London and Washington: Pinter, 1-35.
- Edquist C. and M. Mckelvey, (2000): *Systems of innovation: growth, competitiveness and employment*, Edward Elgar.
- Eichner A.S., (1983): *Why Economics is not yet a Science*, Macmillan Press, London.
- Eisenberg M., (1976): *The structure of the Corporation: A Legal Analysis*. Little, Brown and Co., Boston.
- Elston, J.A. and H. Albach, (1995): "Firm ownership structure and investment: evidence from German Manufacturing", IFO Studien Zeitschrift für Empirische Wirtschaftsforschung, Heft 1.
- ENEA-Cespri-Politecnico di Milano, (1998): *L'Italia nella competizione tecnologica internazionale, secondo rapporto*, Rome.
- Ernst H., (1997): "The Use of Patent data for technological forecasting: the diffusion of CNC- Technology in the Machine Tool industry", *Small Business Economics*, vol.9, n.4, 361-381.
- European Private Equity and Venture Capital Association, (2000): *EVCA Yearbook 2000: Including the Annual survey for 1999*, Belgium.
- Evangelista R., G. Perani, F. Rapiti, and D. Archibugi, (1997): "Nature and impact of innovation in manufacturing industry: some evidence from the Italian innovation survey", *Research Policy*, vol.26, n. 4-5, 521-36.
- Fama E., (1980): "Agency problems and the theory of the firm", *Journal of Political Economy*, vol.88, n.2, 288-307.
- Fama E. and M. Jensen, (1983a): "Separation of ownership and control", *Journal of Law and Economics*, vol.26, n.2, 301-325.
- (1983b): "Agency problems and residual claims", *Journal of Law and Economics*, vol.26, n.2, 327-349.
- Fazzari S.M., Hubbard G.R. and B.C. Petersen, (1988): "Financing Constraints and Corporate Investment", *Brookings Papers on Economic Activity*, n.1, 141-195.

- Fazzari S.M. and B.C. Peterson, (1993): "Working capital and fixed investment: new evidence on financing constraints", *RAND Journal of Economics*, vol.24, n.3, 328-42.
- Ferri G. and N. Pesaresi, (1996): "The missing link: banking and non-banking financial institutions in Italian corporate governance", Nota di lavoro 04/96, Fondazione Enrico Mattei.
- Ferri G. and S. Trento, (1997): "La dirigenza delle grandi banche e imprese", in Barca et al., *Storia del capitalismo italiano dal dopoguerra ad oggi*, Donzelli editore, Rome.
- Fleischer M., (1997): *The Inefficiency Trap*, Berlin, Sigma.
- (1999): "Innovation, Patenting, and Performance", *Economie Appliquée*, vol.52, n.2, 95-119.
- Forrant R., (1997): "The cutting-edge dulled: the post-Second World War decline of the United States machine tool industry", *International Contributions to Labour Studies*, vol.7, 37-58.
- Forrant R. and E. Flynn, (1999): "Skills, Shop-floor participation and the transformation of Brimfield Precision: Lessons for the Revitalisation of the Metal-working Sector", *Industrial and Corporate Change*, vol.8, n.1, 166-188.
- Fox A., (1974): *Beyond contract: Work, power and trust relations*. London: Faber and Faber.
- Franks J. and C. Mayer, (1992): "Corporate Control: a study of the international evidence", Working Paper London Business School.
- (1994): "The Ownership and Control of German Corporations", Manuscript, London Business School.
- (1996): "Hostile takeovers and the correction of managerial failure", *Journal of Financial Economics*, vol.40, n.1, 163-181.
- Franks J., C. Mayer and L. Renneboog, (1996): "The role of large shares stakes in poorly performing countries", Note di Lavoro, Fondazione Enrico Mattei.
- Freeman C., (1995): "The National System of Innovation in Historical Perspective", *Cambridge Journal of Economics*, vol.19, n.1, 5-24.
- Friedman D., (1988): *The misunderstood miracle: industrial development and political change in Japan*, Cornell University Press.

- Galeotti M., Schiantarelli F. and F. Jaramillo, (1994): "Investment decisions and the role of debt, liquid assets and cash flow: evidence from Italian panel data", *Applied Financial Economics*, vol.4, n.2, 121-132.
- Gertler M., (1988): "Financial structure and aggregate economic activity: an overview", *Journal of Money, Credit and Banking*, vol.20, n.3, 559-88.
- Gilchrist S. and C.P. Himmelberg, (1995): "Evidence on the role of cash flow for investment", *Journal of Monetary Economics*, vol.36, n.3, 541-72.
- Giudici E., (1988): *Innovazione Impresa e Ambiente*, Giuffr .
- Gjerding, A. N., (1992): *Working organisation and innovation design dilemma*, in Lundvall B.,: *National Systems of Innovation: Towards a theory of Innovation and Interactive learning*, London: Pinter Publishers.
- Gordon R. and J. Krieger, (1993): "Technological Change, Production Organisation and Skill formation in the U.S. Machine Tool, Semiconductor and Auto Industries", report prepared for the U.S. Department of Labor, Office of Work-Based Learning.
- Gorton G. and F. Schmid, (1999): "Corporate governance, ownership dispersion and efficiency: empirical evidence from Austrian cooperative banking", *Journal of Corporate Finance*, vol.5, n.2, 119-140.
- Goto A., (1982): "Business Groups in a Market Economy", *European Economic Review*, vol.19, n.1, 53-70.
- Grabowski H. G., (1968): "The determinants of industrial research and development: a study of the chemical, drug, and petroleum industries", *Journal of Political Economy*, vol.76, 292-306.
- Greene W.H., (1993): *Econometric Analysis*, Macmillan Publishing Company, New York.
- Greenwald B.C. et al., A.M. Weiss, J.E. Stiglitz, (1984): "Information imperfections in the capital market and macroeconomic fluctuations", *American Economic Review*, vol.74, n.2, 194-199.
- Greenwald B and J.E. Stiglitz, (1992): "Information, finance and markets", *Industrial and Corporate Change*, vol.1, n.1, 37-63.
- Grosse D., (1999): "Technological change in the machine tool industry", Paper submitted to the European Commission, August.

- Guerrieri P. and A. Tylecote, (1998): "Inter-industry Differences in Technical Change and National Patterns of Technological Accumulation", in Edquist C., *Systems of Innovation, Technologies, Institutions and Organisations* Pinter, London.
- Hampel R., (1998): *Hampel report on Corporate Governance*, Gee Publishing, London.
- Harris J.R., Schiantarelli F. and M.G. Siregar, (1994): "The effect of financial liberalisation on the capital structure and investment decisions of Indonesian manufacturing establishments", *The World Bank Economic Review*, n.8, 17-47.
- Harvard Business School, (1991): *The Steel industry*, HBS Case No. 9-792-024.
- Henderson R. and K. Clark, (1990): "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms" in *Administrative Science Quarterly*, 35, p.9-30.
- Herzel L. and R. Shepro, (1990): *Bidders and Targets: Mergers and Acquisitions in the U.S.* Oxford: Blackwell.
- Himmelberg C.P. and B.C. Petersen, (1994): "R&D and internal finance: a panel study of small firms in high tech industries", *Review of Economics and Statistics*, vol.76, n.1, 38-51.
- Hodgetts R.M. and F. Luthans, (1997): *International Management*, London, McGraw Hill.
- Hofstede G., (1991): *Cultures and Organisations: Software of the Mind*, London, McGraw-Hill.
- Hofstede G. and M. Bond, (1984): "The need for synergy among cross-cultural studies" in *Journal of Cross-cultural Psychology*, December.
- Hogan W., (1987): *Minimills and integrated mills: a comparison of steelmaking in the United States*, Lexington, Toronto.
- Hollis M., (1994): *The Philosophy of Social Science*, Cambridge University Press, Cambridge.
- Hoshi T., A.K. Kashyap, and D. Sharfstein, (1991): "Corporate structure, liquidity, and investment: evidence from Japanese industrial groups", *Quarterly Journal of Economics*, vol.106, n.1, 33-60.

- Hubbard G.R. and T.M. Whited, (1995): "Internal finance and firm investment", *Journal of Money, Credit and Banking*, vol.27, n.3, 683-701.
- Hussey J. and R. Hussey, (1997): *Business Research*, MacMillan Press, London.
- Iammarino S., M.R. Prisco and A. Silvani, (1996): "La struttura regionale dell'innovazione", *Economia e Politica Industriale*, n.89, 187-229.
- Il Sole 24 Ore, (1/05/1993): "Macchine utensili: la Hoechst finanzia la brianzola Soitab".
- (30/06/1993): "Macchine utensili in allarme: tassi troppo alti e aiuti bloccati".
- (02/07/1993): "Piccolo era bello ma sopravviverà?"
- (09/07/1993): "Macchine utensili: ordini in picchiata".
- (24/08/1993): "Macchine utensili, Italia in ritirata. Solo 4 aziende tra i big d'Europa".
- (21/09/1993a): "Macchine utensili: domani si chiude ad Hannover la rassegna Emo con un forte calo dei visitatori".
- (21/09/1993b): "Nasce un pool con 14 aziende".
- (14/04/1994): "Nei primi mesi gli ordini cresciuti del 30 %".
- (29/09/1994): "Bimu".
- (07/03/1995): "Industria & sviluppo: la piccola impresa cerca alleati per vincere la guerra della ricerca".
- (22/08/1995): "Macchine utensili a prova di concorrenza se l'azienda batte la strada dell'alleanza".
- (13/11/1995): "I ministri dell'industria invitano gli stati a promuovere investimenti e ricerca nel settore".
- (5/10/1996a): "Dopo un '95 boom, le macchine utensili italiane consolidano le posizioni all'insegna della qualità".
- (5/10/1996b): "Anche se i tassi di sviluppo più elevati sono quelli della Corea, e' sfida per la leadership tra Giappone e Germania".
- (24/01/1997): "Troppe società non scalabili: Il listino rimane così paralizzato".
- (18/02/1998): "L'Italia impari dalla Spagna il valore della ricerca applicata. La competitività richiede sostegni all'innovazione".
- (4/03/1998): "Corporate, attenzione agli errori".
- (03/07/1998): "Radice: incentivi per favorire fusioni tra aziende".

- (23/07/1998): “Chiesta la detassazione per gli accorpamenti tra le Pmi e ammortamenti liberi in un triennio per gli investimenti”.
- (03/10/1998): “Clientela sempre più’ esigente: chiede partnership e non solo macchine”.
- (3/10/1998): “Pmi prime nel rinnovo del parco macchine”.
- (18/12/1998): “La produzione tocca settemila miliardi e nel ’99 crescerà ancora dell’8%”.
- (27/10/1998): “La ricchezza della tecnologia povera”.
- (11/11/1998): “I costruttori di robot chiedono al governo 450 miliardi per rifinanziare gli incentivi agli investimenti”.
- (25/06/1999): “Legge Sabatini nel 2000 estesa anche all’export”.
- Impenna C. and M. Pagnini, (1993): “Holding e gruppi industriali in Italia: mercato e gerarchia nei circuiti dei capitali interni”, *Finanza Imprese e Mercati*, n.2, 151-173.
- Istat, (1994): *Statistiche industriali*, Istituto Nazionale di Statistica, Rome.
- (1995): *Indagine sull’innovazione tecnologica, anni 1990-1992*, Rome.
- (1998): *Statistiche sulla ricerca scientifica e tecnologica*, Rome.
- (1998): “Indagine statistica sull’innovazione tecnologica nell’industria italiana”, *Notiziario*, vol.4, n.13, December.
- Itami H., (1994): “Learning and technology accumulation by Japanese firms and the concept of Ba (interactive field)”, paper presented at Corporate Change Conference, University of New South Wales, Sydney, Australia, 22-24 August.
- Jacobs M. T., (1991): *Short Term America: The Causes and Cures of our Business Myopia*. Cambridge, Mass.: Harvard Business School Press.
- Jacobsson S., (1986): *Electronics and industrial policy: the case of computer controlled lathes*, World Industry Studies Series, n.5, London, Allen and Unwin.
- Jensen M., (1993): “The modern industrial revolution, exit, and failure of internal control systems”, *Journal of Financial Economics*, vol.48, n.3, 831-880.
- Jensen M. and W. Meckling, (1976): “The theory of the firm: managerial behaviour, agency costs, and ownership structure”, *Journal of Financial Economics*, vol.3, n.4, 305-360.

- Johansen F., (1994a): "International finance and in multi-plan firms: evidence from a panel of Norwegian manufacturing firms", mimeo, Statistics Norway.
- (1994b): *Investment and financial constraints: an empirical analysis of Norwegian manufacturing firms*, North-western University.
- Kadapakkam P.R., P. Kumar and L. Riddick, (1998): "The impact of cash flows and firm size on investment: the international evidence", *Journal of Banking and Finance*, vol.22, n.3, 293-320.
- Kamien M.I. and N.L Schwartz, (1982): *Market Structure and Innovation*, Cambridge: Cambridge University Press.
- Kaufmann F., (1978): *Methodology of the Social Sciences*, Harvester Press, England.
- La Porta R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny, (1998a): "Law and Finance", *Journal of Political Economy*, vol.106, n.6, 1133-1155.
- (1998b): "Corporate ownership around the world", NBER Working Paper Series.
- Lassini A., (1991): "Le iniziative per il trasferimento tecnologico in Italia: intervento pubblico e convenienze di mercato", in R.Gianetti and P.A.Toninelli: *Innovazione Imprese e Sviluppo economico*, Fondazione Assi, Il Mulino.
- Lazonick W., (1990): *Competitive Advantage on the Shop Floor*, Harvard University Press, Cambridge, US.
- (1991): *Business organisation and the myth of the market economy*, Cambridge University Press, Cambridge.
- (1993): "Industry Clusters versus Global Webs: Organisational capabilities in the American Economy", *Industrial and Corporate Change*, vol.2, n.1, 1-24.
- (1999): *Reforming Corporate Governance*, mimeo.
- Lazonick W. and M. O' Sullivan, (1996): "Organisation, Finance and International Competition", *Industrial and Corporate Change*, vol.5, n.1, 1-49.
- (1997a): "Finance and Industrial development. Part I: the United States and the United Kingdom", *Financial History Review*, vol.4, n.1, 7-29.
- (1997b): "Finance and Industrial development evolution to market control. Part II: Japan and Germany", *Financial History Review*, vol.4, n.2, 117-138.
- (1998): "Governance of Innovation for Economic Development", paper for the European Commission.

- Lee K.R., (1996): "The role of user firms in the innovation of machine tools: The Japanese case", *Research Policy*, 25, 491-550.
- Leonard-Barton D., (1992): "Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development", in *Strategic Management Journal*, vol.13, 1992.
- Levin R.C., Klevorick A.K., Nelson R.R. and Winter S.G., (1987): "Appropriating the returns from industrial R&D", *Brooking Papers on Economic Activity*, 783-820.
- Locke R., Kochan T. and M. Piore, (1995): *Employment relations in a changing world economy*, Cambridge, Ma: MIT Press.
- Lundvall B., (1992): *National Systems of Innovation: Towards a theory of Innovation and Interactive learning*, London: Pinter Publishers.
- Mace M., (1971): *Directors, Myth, and Reality*, Harvard Business School Press, Boston.
- Malerba F., (1991): "La dinamica di lungo periodo della ricerca e sviluppo dell'industria italiana", in Gianetti R. and P.A.Toninelli: *Innovazione Imprese e Sviluppo Economico*, Fondazione Assi, Il Mulino.
- (1993): "The National System of Innovation: Italy", in R. Nelson: *National Innovation Systems*, Oxford University Press, Oxford.
- Malerba F. and G. Gavetti, (1996): "Il sistema innovativo italiano e l'Europa", *Economia e Politica Industriale*, n.89.
- Manigart S., K. De Waele, M. Wright, V. Robbie, P. Desbrières, H. Sapienza and A. Beekman, (2000): "Venture capitalists, investment appraisal and accounting information: a comparative study of the USA, UK, France, Belgium and Holland", *European Financial Management*, September, vol.6, n.3, 389-403.
- Manne H., (1965): "Mergers and the market for corporate control", *Journal of Political Economy*, vol.73, 110-120.
- Mansfield E., (1986): "Patents and innovation: an empirical study", *Management Science*, vol.32, n.2, 173-181.
- Mariani M., (1993): "Imprese e borsa: risultati di un'indagine su un campione di società non quotate", *Assogestioni: Borsa e opportunità di sviluppo delle imprese italiane*, Quaderni di documentazione e ricerca, n.10.
- Mattioli E. and A. Sterlacchini, (1998): "Fonti e risultati dell'attività innovativa nell'industria italiana: un'analisi settoriale", *L'industria*, vol.XIX, n.1, 49-80.

- Mayer C., (1996): "Corporate governance, competition and performance", OECD Working papers n.164.
- (1999): "Firm Control", Text of an inaugural lecture delivered to the University of Oxford on the 18th February.
- Melman S., (1983): "How the Yankees lost their know-how", *Technology Review*, October, 56-64.
- Metcalf J.S., (2000): "Prospects and challenges for Research on Innovation", paper presented at the Volkswagen Foundation Conference, Berlin, June.
- Miao M., (1993): *An Overview of the Machine Tool Industry: Current Status and Future Prospects with Special Emphasis on the United States and China*, Ann Arbor, Mich: University of Michigan, NSF Center for Dimensional Measurement and Control in Manufacturing, NSF-1/UCRC, July 1993.
- Miles M.B., (1979): "Qualitative Data as an Attractive Nuisance: The Problem of Analysis", *Administrative Science Quarterly*, vol.24, n.1, 590-601.
- Mintzberg H., (1979): "An Emerging Strategy of Direct Research", *Administrative Science Quarterly*, vol.24, n.1, 582-589.
- Modigliani F. and M.H. Miller, (1958): "The cost of capital, corporation finance and the theory of investment", *American Economic Review*, vol.48, n.3, 261-297.
- Molteni M., (1997): *I sistemi di corporate governance nelle grandi imprese italiane*, EGEA.
- Montalenti P., (1997): "E' nei cda che si tutela l'interesse della minoranza", *Il Sole 24 Ore*, 13th September .
- (1998): "Nuove regole da ritoccare", *Il Sole 24 Ore*, 11th February.
- Morck R., Shleifer A. and R. Vishny, (1988): "Management ownership and market valuation: an empirical analysis", *Journal of Financial Economics*, vol.20, n.1/2, 293-315.
- Moretti A., (1999): *Technological Change in the Fine Chemical Industry*, Paper submitted to the European Commission, August.
- Morgan G., (1983): *Beyond method: strategies for Social Research*, Sage Publications, Newbury Park, US.
- Morgan G and L. Smirch, (1980): "The Case for Qualitative Research", *Academy of Management Review*, vol.5, 491-500.
- Mueller, D.C. (1967): "The firm's decision process: An econometric investigation", in *Quarterly Journal of Economics*, p. 58-87.

- Murst, (1997): *Linee per il riordino del sistema nazionale della ricerca scientifica e tecnologica*, Rome.
- Myers S.C. and N.S. Majluf, (1984): "Corporate financing and investment decisions when firms have information that investors do not have", *Journal of Financial Economics*, vol.13, n.2, 187-221.
- Nadler D. and M. Tushman, (1997): *Competing by Design: A Blueprint for Organisational Architectures*, Oxford University Press, Inc.
- National Machine Tools Builders Association, *The machine tool sector*, various numbers.
- National Research Council, (1983): *United States Machine Tool Industry and the Defense Industrial Base*, Washington D.C., National Academy of Science Press.
- Nelson R., (1959): "The simple economics of basic scientific research" in *Journal of Political Economy*, 67, p. 297-306.
- (1992): "National Innovation Systems: A Retrospective on a Study", *Industrial and Corporate Change*, vol.1, n.2, 347-74.
- (1993): *National Systems of Innovation: A Comparative Study*, Oxford: Oxford University Press.
- (1996): "The Evolution of Comparative or Competitive Advantage: A Preliminary Report on a Study", *Industrial and Corporate Change*, vol.5, n.2, 597-617.
- Nelson R.R. and S. Winter, (1977): "In search of a useful theory of innovation", *Research Policy*, vol.6, n.1, 36-76.
- (1982): *An Evolutionary Theory of Economic Change*, Cambridge, MA: Harvard University Press.
- Nelson, R.R, Peck, M.J. and E.D. Kalachek, (1967): *Technology, economic growth, and public policy*, Washington, Brookings Institution.
- Niosi J., P.P. Saviotti, B. Bellon and M. Crow, (1993): "National systems of innovation: in search of a workable concept", *Technology in Society*, vol.15, 207-27.
- OECD, (1991): *Economic survey of Italy*, Paris.
- (1992a): *OECD Proposed Guidelines for Collecting and Interpreting Technological Innovation Data – Oslo Manual*, OCDE/GD (92) 26, OECD, Paris.

- (1992b): *Reviews of national science and technology policy: Italy*.
- (1994): *Economic survey of Italy*, Paris.
- (1995): *Economic survey of Italy*, Paris.
- (1996): *Innovation, patents and technological strategies*, Paris.
- (1997a): *National Innovation Systems*, Paris.
- (1997b): *Economic survey of Sweden*, Paris
- (2000): *Economic survey of Italy*, Paris.
- Onida F., (1991): *Gli scambi internazionali di macchine utensili: analisi per mercati e concorrenti e prospettive per l'Italia*, Milan: Cespri.
- Pacelli L. and F. Rapiti, (1995): "Struttura occupazionale e mobilita' del lavoro nei settori a diversa intensita' innovativa: primi risultati da un'analisi empirica", *L'industria*, n.1.
- Pagano M., F. Panetta and L. Zingales, (1996): "The stock market as a source of capital: some lessons from initial public offerings in Italy", *European Economic Review*, vol.40, n.3-5, 1057-69.
- (1998): "Why do companies go public? An empirical analysis", *Journal of Finance*, vol.53, n.1, 27-64.
- Patel P. and K. Pavitt, (1994), "National Innovation Systems: Why they are Important, and How they Might be Measured and Compared", *Economics of Innovation and New Technology*, vol.3, n.1, 77-95.
- Persson B., (1997): "Unions, management and the government: the Swedish model", *International Contributions to Labour Studies*, vol.7, 119-133.
- Piore M.J., (1979): "Qualitative Research Techniques in Economics", *Administrative Science Quarterly*, vol.24, n.1, 560-569.
- Porter M.E., (1979): "How competitive forces shape strategy", *Harvard Business Review*, March/April.
- (1985): *Competitive Advantage: Creating and Sustaining Superior Performance*, Free Press, Collier Mcmillan, New York.
- (1998): "Clusters and New Economics of Competition: new agendas for companies, governments and institutions", *Harvard Business Review*, November-December, 77-90.
- Prahalad C.K., (1993): "The Role of Core Competencies in the Corporation" in *Research/Technology Management*, November-December, p. 40-47.

- Prahalad C.K and G. Hamel, (1990): "The Core Competence of the Corporation" in *Harvard Business Review*, May/June.
- Pugh D.S. and D.J. Hickson, (1979): *Organisational Structure in its Context*, Saxon House, England.
- Ramirez P. and A. Tylecote, (1999): *Technological change in the pharmaceutical industry: A literature review from the point of view of Corporate Governance*, Paper submitted to the European Commission, August.
- Reid G., (1993): *Small Business Enterprise: an economic analysis*, Routledge, London.
- Renneboag L., (1998) "Concentration of Ownership and Pyramidal shareholding structures in Belgian listed companies", in M. Balling et al. (eds.) *Corporate Governance, Financial markets and Global Convergence*, Kluwer Academic Publishers.
- Ricottilli M., (1989): *Progresso tecnico ed innovazione*, Franco Angeli, Milano.
- Rosenberg N., (1994): *Exploring the black box*, Cambridge University Press, Cambridge.
- Sarcinelli M., (1996): "The Italian Financial System in the Mid-1990s: A Difficult Transition", *Banca Nazionale del Lavoro Quarterly Review*, vol.49, n.196, 3-35.
- Schaller H., (1993): "Asymmetric Information, Liquidity Constraints and Canadian Investment", *Canadian Journal of Economics*, vol.26, n.3, 552-74.
- Scherer F.M, (1965): "Firm size, market structure, opportunity, and the output of patented inventions" in *American Economic Review*, 55, p. 1097-1125.
- Schiantarelli F., (1996): "Financial constraints and investment: methodological issues and international evidence", *Oxford Review of Economic Policy*, vol.12, n.2, 71-89.
- Schiantarelli F. and A. Sembenelli, (1996): "Forms of ownership and financial constraints", *Policy Research Working Paper*, n.629.
- Schumpeter J.A., (1939): *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process*, 2 vols. New York: McGraw Hill.
- (1942): *Capitalism, Socialism, and Democracy*, New York: Harper.
- Sciberras E. and B.D. Payne, (1985): *Machine Tool Industry, Technical change and International Competitiveness*, Harlow, Essex, Longman.

- Sforzi F., (1990): *The quantitative importance of Marshallian industrial districts in the Italian economy*, in Pyke F., Becattini G., Sengerberger W., *Industrial districts and inter-firm co-operation in Italy*, Ilo, Ginevra.
- Shleifer A. and R.W. Vishny, (1986): "Large Shareholders and Corporate Control", *Journal of Political Economy*, 94, 461-488.
- (1997): "A survey of corporate governance", *The Journal of Finance*, vol.52, n.2, 737-783.
- Smith A., (1976): *The Wealth of Nations*, R.H. Campbell and A.S. Skinner (ed), Clarendon Press, Oxford.
- Soskice D., (1997): "German technology policy, innovation, and national institutional frameworks", *Industry and Innovation*, vol.4, n.1, 75-96.
- (1999): "Divergent production regimes: coordinated and uncoordinated market economies in the 1980s and 1990s", in H. Kitschelt et al.: *Continuity and Change in Contemporary Capitalism*, Cambridge University Press.
- Sprow E., (1985): "Industry Report- Machine tools", *Tooling & Production*, June, 35-72.
- Stephan P., (1996): "The economics of science", *Journal of Economic Literature*, vol.34, n.3, 1199-1235.
- Steward R., (1997): *The reality of management*, Butterworth-Heinemann, Oxford.
- Stiglitz J. and A. Weiss, (1981): "Credit rationing in markets with imperfect information", *American Economic Review*, vol.71, n.3, 393-410.
- Strahan P.E., (1998): "Securities class actions, corporate governance and managerial agency problems", Working paper, Federal Reserve Bank of New York.
- Stulz R., (1988): "Managerial control of voting rights", *Journal of Financial Economics*, vol.20, n.1/2, 25-59.
- Tecnologie meccaniche, (1983): "Normativa sull'estinzione del rapporto di lavoro: cosa dice la legge", November.
- (1984a): "Una spinta al rinnovamento", July.
- (1984b): "Una Silicon Valley piemontese?", October.
- (1985a): "La specializzazione tecnologica delle macchine utensili italiane", June.
- (1985b): "L'Italia in prima fila", November.
- (1985c): "La banca d'affari, questa sconosciuta", December.

- (1986): "O la borsa ...o la vita", September.
- (1992a): "L'industria mondiale della macchina utensile", June.
- (1992b): "Le prime 200", June.
- (1992c): "La macchina utensile europea", August.
- (1992d): "L'Italia dei CNC", November.
- (1992e): "Per competere sul mercato globale", November.
- (1992f): "Come operare in aree non OCSE", November.
- (1993a): "Commercio estero di macchine utensili", January.
- (1993b): "Giappone: a confronto con la recessione", January.
- (1993c): "Ma com'e' questa crisi?", February.
- (1993d): "L'Italia si deindustrializza", March.
- (1993e): "Uno sguardo al futuro", March.
- (1994a): "Come cambia il commercio mondiale", March.
- (1994b): "Quali strategie per l'Europa della macchina utensile", March.
- (1994c): "Inversione di rotta", April.
- (1995a): "Gli anni settanta", March.
- (1995b): "Il canale distributivo", March.
- (1995c): "Dalla parte degli utilizzatori", March.
- (1995d): "La strada della macchina utensile", March.
- (1995e): "Successo per la macchina utensile europea", September.
- (1996a): "Finanziamenti agevolati. Come fare?", January.
- (1996b): "Confrontarsi per crescere e ....vincere", January.
- (1996c): "Grande fermento", January.
- (1996d): "Costruttori italiani insieme alla conquista degli USA", June.
- (1998): "Una "46" chiamata desiderio", January.
- (1998a): "Il trasferimento tecnologico", June.
- (1998b): "Le prime 200", June.
- (1998c): "Verso l'impresa globale", July.
- (1998d): "150 nel segno dell'Euro", July-August.
- (1998e): "Il mercato italiano di controlli numerici", November.
- (1998f): "Bimu", November .
- (1999a): "Al via il 5° programma quadro", July-August.
- (1999b): "Giappone: il tramonto del Sol Levante", July-August.

- Teece D.J and H.O. Armour, (1977): "Innovation and divestiture in the U.S. oil industry" in D.J. Teece ed., *R&D in energy – Implications of petroleum industry reorganisation*, Stanford, Institute for Energy Studies.
- The Economist (13<sup>th</sup> June, 1998a): "Europe's great experiment".  
 (6<sup>th</sup> Aug, 1998b): "Unmasking Italian investor relations".  
 (27<sup>th</sup> March, 1999): "Spaghetti junction".  
 (22<sup>th</sup> April, 2000a): "The final curtain".  
 (29<sup>th</sup> April, 2000b): "Good heavens, good governance".  
 (29<sup>th</sup> Jun, 2000c): "Late, unlamented".
- Todd D.J., (1979): "Mixing Qualitative and Quantitative Methods: Triangulation in Action", *Administrative Science Quarterly*, vol.24, n.1, 602-611.
- Trenti S., (1999): "La competitività tecnologica dei settori industriali italiani: un'analisi empirica", unpublished paper.
- Turnbull S., (1997): "Corporate Governance: Its scope, concerns and theories", *Corporate Governance: an international review*, vol.5, n.4, 180-205.
- Tushman M. and P. Andreson, (1986): "Technological discontinuities and organisational environments" in *Administrative Science Quarterly*, 31, p. 439-465.  
 (1997): *Managing Strategic Innovation and Change*, Oxford University Press, Oxford.
- Tylecote A., (1992): *The Long Wave in the World Economy*. London: Routledge.  
 (1995a): "Financial Systems and Innovation", ch.19 in M. Dodgson and R. Rothwell (eds.) *Handbook of Industrial Innovation*, Cheltenham: Edward Elgar.  
 (1995b): "Technological and economic long waves and their implications for employment", *New Technology, Work and Employment*, vol.10, n.1, 3-18.  
 (1996a): "Managerial Objectives and Technological Collaboration: The Role of National Variations in Cultures and Structure", in R. Coombs, A. Richards, P.P. Saviotti and V. Walsh (eds.): *Technological Collaboration: the Dynamics of Cooperation in Industrial Innovation*, Cheltenham: Edward Elgar, ch.3.  
 (1996b): "Cultural Differences Affecting Technological Innovation in Western Europe", *European Journal of Work and Occupational Psychology*, vol.5, n.1, 137-47.

- (1997): "Financial Systems, Corporate Governance and Product Innovation", CRITEC Paper n.17, Sheffield University Management School.
- (1999a): *Corporate Governance and Product Innovation: A Critical Review of The Literature*, Paper submitted to the European Commission, May.
- (1999b): "Guide to structuring of technical change surveys", mimeo.
- (2000): "Corporate governance and innovation: the new British disease?", mimeo.
- Tylecote A. and E. Conesa, (1999): "Corporate Governance, Innovation Systems and Industrial Performance", *Industry and Innovation*, vol.6, n.1, 25-50.
- Tylecote A. and I. Demirag, (1992) "Short-termism: Culture and Structures as Factors in Technological Innovation", in R.Coombs, V.Walsh and P.Saviotti (eds.) *Technological Change and Company Strategies*, London: Academic Press, 201-225.
- Tylecote A. and H. Mitsuhiro, (1993): "Technological innovation and performance pressures in Europe and Japan", *Hitotsubashi Journal of Commerce and Management*, vol.28, n.1, 61-76.
- Tylecote A, C. Yong-Doo and Z. Wei, (1998): "National Technological Styles Explained in Terms of Stakeholding Patterns, Enfranchisement and Cultural Differences: Britain and Japan", *Technology Analysis and Strategic Management*, vol.10, n.4, 423-35.
- UCIMU, (1999): *The machine-tool sector in Italy*, UCIMU, Milan.
- Van Maanen J., (1979): "Reclaiming Qualitative Methods of Organisational Research: A Preface", *Administrative Science Quarterly*, vol.24, n.1, 520-526.
- (1983): *Qualitative Methodology*, London: Sage.
- Weigand J. and D.B. Audretsch, (1998): "Does science make a difference? Investment, finance and corporate governance in German industries", Discussion Papers Series, Centre for Economic Policy Research.
- Weimer J. and J.C. Pape, (1999): "A taxonomy of systems of corporate governance", *Corporate Governance: an international review*, vol.7, n.2.
- Weisbach M., (1988): "Outside directors and CEO turnover", *Journal of Financial Economics*, vol.20, n.1/2, 431-460.
- Whited T.M., (1992): "Debt, Liquidity constraints and corporate investment: evidence from panel data", *Journal of Finance*, vol.47, n.4, 1425-1460.

- Wieandt A., (1994): "Innovation and the Creation, Development and Destruction of Markets in the World Machine Tool Industry", *Small Business Economics*, vol.6, n.6, 421-37.
- Worthington P.R., (1995): "Investments, cash flows, and sunk costs", *The Journal of Industrial Economics*, vol.43, n.1, 49-61.
- Wruck K., (1989): "Equity ownership concentration and firm value", *Journal of Financial Economics*, n.23, 3-28.
- Yin R., (1994): *Case Study Research: Design and Methods*, Beverly Hills: Sage.
- Zingales L., (1994): "The value of the voting right: A study of the Milan stock exchange experience", *The Review of Financial Studies*, vol.7, n.1, 125-148.
- Zuliani A., (1994): "La struttura produttiva italiana alla luce dell'ultimo censimento", *L'industria*, vol.XV, n.1, 3-42.

#### **On-line references**

Aifi: [www.aifi.it](http://www.aifi.it)

Borsa Italia: [www.borsaitalia.it](http://www.borsaitalia.it)

Consob: [www.consob.it](http://www.consob.it)

Cecimo: [www.cecimo.be](http://www.cecimo.be)

EVCA: [www.evca.com](http://www.evca.com)

Federation of European Stock Exchanges: [www.fese.be/](http://www.fese.be/)

[Http://www.airi.it/Archivio/Rep-Tecn99/Settore10.htm](http://www.airi.it/Archivio/Rep-Tecn99/Settore10.htm)

[Http://mmsonline.com/reports/](http://mmsonline.com/reports/)

[Http://www.americanmachinist.com/library/features/aug96/lathes.htm](http://www.americanmachinist.com/library/features/aug96/lathes.htm)

[Http://www.vencap.se](http://www.vencap.se)

SWCA: [www.SWCA.se](http://www.SWCA.se)

UCIMU: [www.ucimu.it](http://www.ucimu.it)

