CHAPTER 3

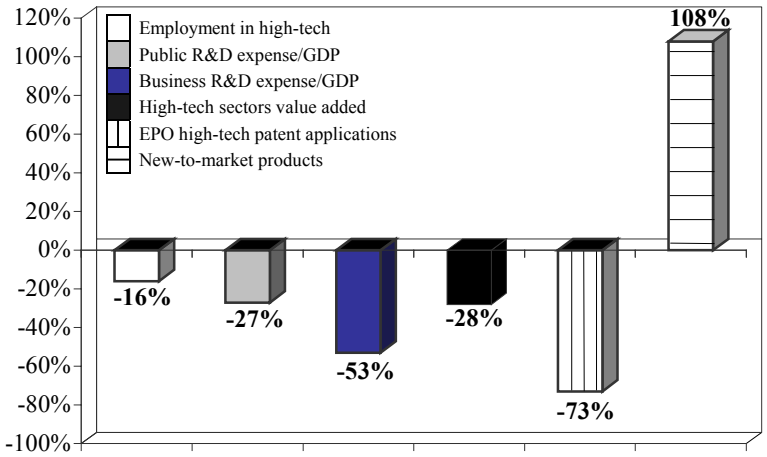
THE ITALIAN INNOVATION SYSTEM AND ITS POTENTIAL FOR HIGH-TECH START-UPS

This chapter summarizes figures and characteristics of the Italian Innovation System through the analysis of general indicators for high-tech activity, the available start-up capital and seed capital sources, and the identification of concentrations of high-tech activity. Findings on the Italian Innovation System have been used as basic facts and data for planning the proposed projects which will be presented in Chapter 4.

3.1 - General Characteristics of the Italian Innovation System

Figure 3.1 presents the major innovation and R&S indicators for Italy as opposed to the EU average. It is easy to mark the sharp contrast between the first five indicators (representing the Italian position in the high-tech industry), all significantly below the EU average, and the last one (new-to-market products) which is significantly higher than the EU average. In order to correctly interpret this data, it is necessary to distinguish between two different and often misused concepts: *innovative* as opposed to *research-intensive* firms.

Figure 3.1 - Main Innovation Indicators, Italy vs. Europe



Source: University of Pavia elaboration on Eurostat and OECD data

An *innovative firm* often changes its products, services, or its production processes. It often (but not always) uses new technologies, but does not necessarily produce them. When such a firm is founded, its time-to-market is usually not longer than six months. Extremely common in Italy, this kind of firm usually deals with incremental innovation or with the diffusion of existing technologies and their adaptation to different kinds of customers. This has been the case for a large number of Internet companies that were newly created in Italy in the 1990's. One of them, Tiscali, has become one of the largest Internet service providers in Europe. It is worth mentioning that even if the Internet can be regarded as a special case, Northern Italy would still be well known for its many small and medium enterprises in a variety of low and medium-tech sectors, from fashion to mechanics.

On the other hand, a *research-intensive firm* is one that actually creates new technologies or new products by means of scientific and technological research. It has a large percentage of highly skilled personnel and a high R&S to turnover ratio, and its innovation is often radical. With the creation of such a firm, a significant financial effort is needed even before the first prototype is produced, and time-to-market is no less than two years. [2]

It is important to stress that, unlike "simply innovative" companies, research-intensive firms are very rare in any part of Italy. Orsi (2001), for example, remarks that while 80% of R&S industrial expenditures are sustained by firms with over 500 employees, only 2% are sustained by firms with less than 50 employees.

Given the different financial needs of innovative firms as opposed to the research-intensive ones, and having established that the former are very common in Italy while the latter hardly exist, policy orientation must distinguish between these two kinds of activity. For this purpose a uniform policy for both innovative firms and generic New Technology-Based Firms would be inadequate. For additional studies on the Italian Innovation System please refer to Malerba, 1993; Malerba and Gavetti, 1996 and Modena et al., 2001.

[2] More on the importance of this distinction can be found in Oakey, 1995 or, in the Italian case, in Calderini, 2000.

3.2 - High-tech Activity per Sector and Geographical Region

Since the Italian territory is large and non-uniform, it was found necessary to map the potential for high-tech spin-offs according to various geographical areas. This was especially important because, as was explained in section 1.4 (paragraph 1), it is imperative that venture capital funds for the high-tech industry are launched in areas where conducive background conditions already exist, and where there is significant potential for high-tech start-ups.

Various data have been processed, such as R&S expenses, production units and skilled personnel per region, as well as *inventors*[3] per *local systems*[4], and sector. This part of the IFISE project, which was conducted by Modena et al, (2001), has come to the following conclusions:

1. The region in Italy with the highest potential for high-tech start-ups is Lombardia. Activity in this region is distributed among different sectors; mainly electronics, biotech, fine chemistry, and industrial automation.
2. Italy does not have a comparative advantage in any of the high-tech sectors except for industrial automation (to the extent that this can be considered a high-tech sector).
3. The central and northern regions of the country have significantly larger potential in the high-tech sector than the southern regions. This is especially true for industrial research, but academic research is also stronger and more efficient in these areas (see also Balconi et al, 2002; Murst, 1999).
4. Lazio, and Rome in particular, have a high concentration of academic research activity.
5. Few significant local systems exist in Italy in terms of high-tech activity. These include electronics in the Milan and Turin areas, biotech (pharmaceuticals) in Milan and Rome, industrial automation in Milan, Turin, and Bologna, and, to a lesser degree, semiconductors in Catania.

[3] Inventors were defined as individuals who have filed at least one patent in a high-tech sector. This definition, and the use of inventors as an indicator of high-tech activity, has already been used by Ferrari et al [1999]. For the use of patents as a ST indicator, see OECD, 1994.

[4] These are defined as job-intense commuting areas – see also ISTAT, 1998.

6. Although the Milan area is by far the most active of the high-tech sectors, its potential is divided into different sectors such that it cannot be considered a cluster, at the European level, in any of the high-tech sectors.

These conclusions have been inferred from, among others, tables 3.1 and 3.2. Keeping in mind that the single most important ingredient for any high-tech development - and for start-ups in particular - is skilled manpower, much attention was given to the indicators relating to that factor. To what extent a researcher or an "inventor" (an individual that has filed a patent pertaining to a high-tech sector) can be considered a potential entrepreneur is a question that could not be addressed in the framework of this project. Such a task would involve assessing the readiness of skilled manpower to set up their own company. However, it is our belief that well-planned public programmes (including VC provision, assistance and advertising) do in fact affect the readiness of an individual to become an independent entrepreneur. Therefore the basic empirical indicator to look at remains the skilled manpower concentrations.

Table 3.1 – Major R&D Indicators per Geographical Region

Region	R&D personnel in public and private enterprise: % of national total	R&D personnel in public institutions: % of national total	Total R&D personnel: % of national total	R&D personnel total per 1,000 inhabitants	Added value: % of national total	Civilian R&D expenditure % of national total (1994)	Index of R&D expenditure (per population) [1]
Piemonte, Valle d'Aosta	**24.5**	4.4	**13.2**	**4.3**	**11.3**	**15,4**	**0.33**
Lombardia	**33.2**	**11.9**	**21.2**	**3.4**	**27.3**	**23.6**	**0.2**
Trentino Alto Adige	0.5	0.9	0.7	1.2	1.4	0.8	-0.33
Veneto	4.6	4.6	4.6	1.5	**11.1**	4.7	-0.24
Friuli Venezia Giulia	2.2	2.1	2.2	2.6	2.2	2.5	0.09
Liguria	3.3	3.7	3.5	3.0	3.0	3.5	0.08
Emilia Romagna	7.6	8.1	7.9	2.9	9.7	7.4	0.03
Toscana	3.9	8.2	6.3	2.5	7.3	5.9	-0.02
Umbria	0.4	1.8	1.2	2.1	1.4	0.9	-0.22
Marche	0.6	1.6	1.2	1.2	2.7	1.0	-0.43
Lazio	**9.9**	**27.4**	**19.7**	**5.5**	6.6	**19.0**	**0.35**
Abruzzo, Molise	2.0	2.0	2.0	1.8	2.1	1.8	-0.22
Campania	4.1	**8.8**	6.7	1.7	4.1	5.4	-0.29
Puglia	1.5	3.5	2.6	0.9	3.4	2.2	-0.53
Calabria Basilicata	0.4	1.8	1.2	0.6	1.3	1.1	-0.62
Sicily	1.0	6.5	4.1	1.2	3.5	3.5	-0.43
Sardinia	0.3	2.7	1.7	1.4	1.6	1.3	-0.38
Total	100.0	100.0	100.0	2.5	100.0	100.0	0.00
Northwest	**61.0**	20.0	**37.9**	3.6	**41.6**	**42.5**	**0.23**
Northeast	14.9	15.7	15.4	2.1	24.4	15.4	-0.09
Centre	14.8	**39.0**	28.4	**3.7**	18	26.8	0.17
South and islands	9.3	25.3	18.3	1.3	16	15.3	-0.4

Highest values are shown in bold

[1](Regional expenditure divided by national expenditure)/(regional population/national population). The index was normalized as to give results in the interval [-1,1]. National average value corresponds to zero

Table 3.2 below was created so as to locate any concentrations of high-tech activity in a local system in a given sector. A local system is defined as a work-intensive area, the extent of which is defined by commuting distance. Looking at a local system rather than looking at a whole region permits us to spot smaller realities that would fade within a regional context. Moreover, this analysis gives some insight into the various sectors, thereby permitting identification of local advantage within local systems. For example, we have found that Catania, which is part of the underdeveloped region of Sicily, has significant activity in the field of semiconductors. The analysis also shows how the high-tech activity in Milan is distributed among different sectors. The last column in Table 3.2 gives a measure of the ratio of inventors to employees in a given sector and a given local system as opposed to the same ratio as calculated at national level. This gives a comparison of innovative trends between areas that are active in the same sector. For instance while the area of Milan shows a higher level of employees and production units in the field of fine chemistry, employees in the areas of Novara and Cairo Montenotte (Savona) show a stronger trend to patenting and therefore to product or processes innovation. A deeper analysis of the interpretation of these indicators can be found in Modena [2002].

Table 3.2 - R&D Indicators per Main High-tech Sector and Local System

Sector	Region	Labour local system (LLS) [1]	Inventors per LLS and % of total investors in the period 1995-99 [2]	Weighted inventors per LLS and % of total number of patents - 1995-99 [2]	Production units per LLS and % of sector total - 1996 [3]	Employees per LLS and % of sector total – 1996 [3]	Index of inventors Intensity [4]
Pharmaceutical	Lombardia	Milano	224 (31.8%)	108 (32.2%)	281 (30.1%)	27,420 (40.9%)	-0.13
	Lazio	Rome	85 (12.1%)	58 (17.3%)	125 (13.4%)	6,864 (10.2%)	0.08
		Sector (national) total	705 (100%)	335 (100%)	933 (100%)	67,032 (100%)	
Computer hardware, semiconductors and electronics components	Lombardia	Milano	186 (28.4%)	228 (35.4%)	260 (13. 4%)	12,966 (25. 9%)	0.05
	Sicilia	Catania	39 (11.2%)	50 (7.8%)	13 (0.7%)	1,969 (3.9%)	0.08
		Sector (national) total	655 (100%)	644 (100%)	1,943 (100%)	49,984 (100%)	
Consumer electronics and telecommunication hardware	Lombardia	Milano	145 (25.3%)	104 (28.0%)	331 (15.1%)	14 253 (26.1%)	-0.02
	Piemonte	Torino	62	30	103	1,872	0.52
		Ivrea (TO)	15	6	8	129	0.83
		Total	77 (13.4%)	36 (9.7%)	111 (5.1%)	2,001 (3.7%)	0.57
	Lazio	Roma	48 (8.4%)	35 (9.4%)	173 (7.9%)	5,802 (10.6%)	-0.12
		Sector (national) total	573 (100%)	371 (100%)	2,198 (100%)	54,618 (100%)	
Precision instruments	Lombardia	Milano	121 (21.7%)	65 (18.6%)	355 (21.8%)	5,839 (21.2%)	0.01
	Piemonte	Torino	38 (6.8%)	19 (5.4%)	90 (5.5%)	1,422 (5.2%)	0.14
	Emilia Romagna	Bologna	27 (4.8%)	20 (5.7%)	41 (2.5%)	1,110 (4.0%)	0.09
		Sector (national) total	557 (100%)	349 (100%)	1,631 (100%)	27,581 (100%)	
Fine chemistry	Lombardia	Milano	67	37	400	7,794	-0.07
		Bergamo	7	15	58	1,198	-0.26
		Como	12	11	30	941	0.12
		Total	86 (25.7%)	63 (30.7%)	488 (21.3%)	9,933 (29.5%)	-0.07
	Liguria	Cairo Montenotte (SV)	55 (16.5%)	35 (17.1%)	1 (0.0%)	1,499 (4.5%)	0.57
	Piemonte	Novara	26 (7.8%)	13 (6.3%)	17 (0.7%)	788 (2.3%)	0.54
		Sector (national) total	334 (100%)	205 (100%)	2,228 (100%)	33,656 (100%)	
Industrial Automation	Piemonte	Torino	39 (16.6%)	34 (15.7%)	62 (7.2%)	722 (4.9%)	0.54
	Lombardia	Milano	21 (8.9%)	19 (8.8%)	156 (18.1%)	3,406 (23.1%)	-0.44
	Emilia Romagna	Bologna	11 (4.7%)	17 (7.8%)	33 (3.8%)	886 (6.0%)	-0.12
		Sector (national) total	235 (100%)	217 (100%)	862 (100%)	14,772 (100%)	

[1] Source: ISTAT, 1997, Local Labour Systems
[2] Source: University of Pavia elaboration on EPO data
[3] Source: ISTAT, 1996
[4] Intensity of inventors is defined as the ratio of inventors to personnel in a specific sector and local system. The index was normalized as to give results in the interval [-1,1]. The average value for a sector at national level corresponds to zero

In order to get further insights on high-tech activity by sector, it was decided to look into more details of the biotech, electronics, and telecommunication sectors. A short outline follows in the next two sections.

3.3 - The Electronics and Telecommunication Sector

Although Italy is a large market for electronics and telecom businesses (it is the largest European market for mobile phones), the country creates little production - and innovation - as testified by the negative trade balance shown in table 3.3. The relatively strong VC investment in 2000-2001 can be easily explained by industry deregulation, which led to a large number of small *carrier providers.*

Table 3.3 - Electronic Components, Computer Hardware and Telecommunication Equipment - National Basic Indicators

Electronics components	**1998**	**1999**	**2000**	**99/98**	**00/99**
Turnover	2,117	2,159	2,319	2.0%	7.4%
Export	1,020	1,137	1,198	11.4%	5.4%
Import	1,539	1,562	1,647	1.4%	5.5%
Trade balance	-519	-425	-449	18.1%	-5.6%
Computer hardware	**1998**	**1999**	**2000**	**99/98**	**00/99**
Turnover	3,712	3,935	4,328	6.0%	10.0%
Export	1,978	2,012	2,133	1.7%	6.0%
Import	2,999	3,285	3,739	9.4%	13.9%
Trade balance	-1,021	-1,273	-1,606	-24.7%	-26.1%
Telecommunications equipment	**1998**	**1999**	**2000**	**99/98**	**00/99**
Turnover	10,716	11,290	12,627	5.3%	11.8%
Export	2,789	2,846	2,918	2.0%	2.5%
Import	3,202	3,424	3,951	6.9%	15.4%
Trade balance	-413	-578	-1,033	-39.9%	-78.7%

Source: Website ANIE, 2002

To the extent that the Internet can be considered part of the telecommunications sector, it is worth recalling that the tide of new Internet companies that swept through Europe in the late 1990's also touched Italy. However, in addition to some Internet providers like the aforementioned Tiscali, most of the resulting firms were “dotcoms”, i.e., websites aimed at the commercialisation of various products or services. No significant radical innovation appears to have been developed in Italy.

The computer sector has been heavily affected by the closing of the Olivetti computer production company, which was one of largest manufacturers in Europe in the 1980's. Currently, no computer producer is active in the country.

In the field of electronics, the only large firm with significant operations in Italy is STMicroelectronics, which holds its major R&D centres in Milan and Catania (Sicily). Other significant R&D firms are Alcatel, Siemens, Bull, Ericsson and Telecom Italia; however, none of these has more than 1,000 R&D personnel in Italy [Modena et al, 2001].

The activity in Milan and Catania for this sector has been studied further in order to check the spin-off potential in both areas. As clearly emerges from table 3.1 and 3.2, the greater Milan area (including Pavia, Bergamo, Brescia and Varese) has the highest activity for the electronics sectors. The technical schools of Milan and Pavia together count some 500 researchers in electronics-related fields. The R&D centres of large multinationals, including Alcatel, Bull, Ericsson, Siemes, Pirelli and STMicroelectronics, as well as smaller centres of Agilent, Lucent and Phillips, account together for some 5,300 R&D personnel (Gattoni, et al, 2001).

Private venture capital is available in Milan, as most VC management companies are located in the area, but no significant public support grants are obtainable as the area is not considered a priority development area.

The IFISE team reasoned that given these conditions, the provision of seed capital for the high-tech industry could bring more *research-intensive* firms to the level at which they could be of interest to venture capital funds (which mostly provide subsequent funding), thereby enhancing their success probability. Project One in Chapter 4 is also aimed at answering this need.

As far as the area of Catania (Sicily) is concerned, it was found that approximately 1,200 engineers and scientists are present in the area. A little less than 1,000 of these are currently working for STMicroelectronics, which dominates the industry in the region. Between 10 to 20 start-ups (according to definition) were found in the area at various levels of research intensity; at least five of them are STM spin-offs and related to the semiconductor sector. No venture capital fund is established in the area and only one VC investment has been reported. Torrisi [2002], who has studied the Catania area, defines this set of conditions as a “pre-cluster” situation.

We reasoned that the existing conditions in Catania are not sufficient to justify the creation of venture capital funds dedicated to the high-tech sectors. In other words, a critical mass of activity and skilled personnel is not present in the region [Modena, 2002]. Therefore the desirable policy for this area would be to continue attracting R&D departments of large multinational firms, as was done in the past, until a critical mass of activity is achieved. This can be done by means of the generous funds available under the EU structural funds, since Catania (Sicily) is an "Objective 1 area" (see also section 3.6.6).

3.4 - The Biotech Sector

In the last ten years the biotech sector has created interest among investors, especially due to the scientific revolution which has occurred mainly in the field of genetics. Despite being the fifth-largest world market for pharmaceuticals, Italy has largely remained out of the industrial blossoming that has swept the sector. Table 3.4 shows how both investments and human resources in industrial R&S are lower in Italy than in the major developed countries.

Table 3.4 – R&D Investments and Personnel in the Biotech-Pharmaceutical Sector in Italy and in the Major Industrialized Countries

Investments in R&D						
	Italy	France	Germany	UK	U.S.A.	Japan
Investments R&S/turnover (%)	6.02	12.33	10.72	19.97	15.91	20.04

R&D Personnel						
	Italy	France	Germany	UK	U.S.A.	Japan
R&D Personnel (number)	5,024	15,200	15,000	20,900	51,000	34,437
R&D personnel/total personnel (%)	7.18	16.87	12.99	28.25	19.62	28.24

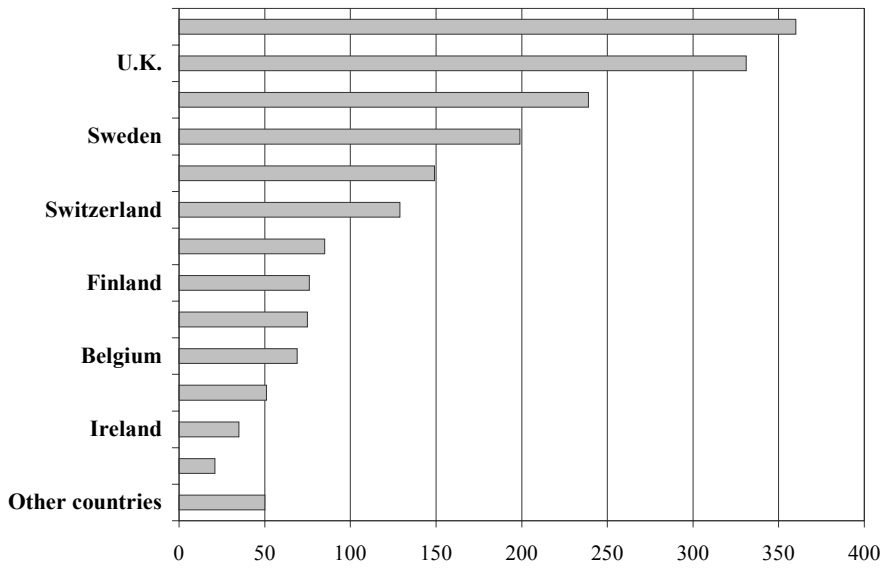
Source: Farmindustria, 2000

However, Italy boasts strong academic research in this sector. It was found that as many as 10,000 researchers (or about half of all researchers in S&T) are active in related fields (genetics, medicine, biotech or pharmaceuticals). These are relatively evenly distributed throughout the country [Modena, 2002]. It is also worth noting that the number of physicians per capita in Italy is twice as large as the average in other European countries. Although doctors as such may not be considered potential entrepreneurs, they certainly make up a reservoir of skilled manpower in the biotech-pharmaceutical field.

The most active centres in Italy are the greater Milan and Rome metropolitan areas, although only Milan can count on significant industrial R&D. Other significant concentrations of academic activity exist throughout the country (such as Turin, Padova, Bologna, Pavia and Naples).

In spite of a large market and the significant potential found in the academic sector, biotech spin-offs hardly exist. Figure 3.2 shows that Italy has one of the lowest number of enterprises in the biotech sector in Europe (around 50). This number is even lower than that of countries like Finland and Denmark, whose population is less than a tenth of Italy's and which have no exceptional life science industry.

Figure 3.2 - Enterprises in the Biotech Sector in Major European Countries per Country



Source: Ernst & Young, 2003

The identification of such a market failure is of great importance, as it helps to show that a generous public programme dedicated to the biotech sector would be in the common interest of Italy and Europe, in that it would help use unexploited potential. In order to strengthen our case, we should mention that private VC fund investments in the biotech-related field also hardly exist (see table 3.5). Moreover, as compared to their colleagues in the U.S., U.K., Germany and France, large firms in Italy are very reluctant to invest in the acquisition of licenses for new products if these have not reached phase three of development [Farmindustria, 2000]. Fiorilli [2002] has validated these results by interviewing a number of market actors in Italy. These interviews also pointed out that a programme for targeting early stage investments would be most useful for bringing research results from academic laboratories to a point where they could be of interest for private investors.

Table 3.5 - Number of Investments and of Early Stage Investments in the Biotech and Pharmaceuticals Sectors - year 2001

Sector	Number of investments	Number of early stage investments
Biotech	6	1
Pharmaceuticals	5	3
Total	11	4

Source: Gervasoni, 2002

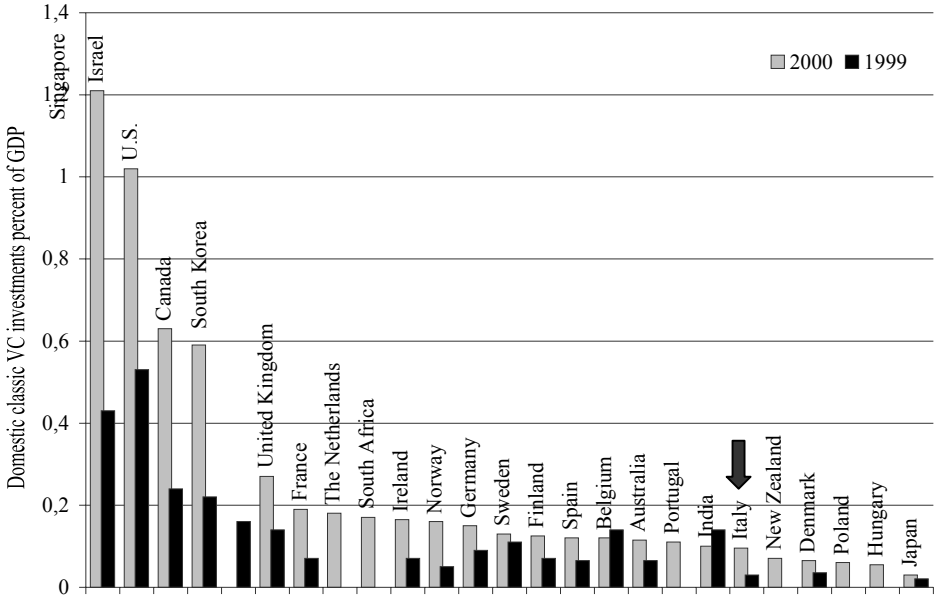
It is our belief that the above arguments could be used by any public authority wishing to launch a programme dedicated to the biotech sector as partial demonstration that the programme does not "adversely affect trading conditions to an extent contrary to the common interest", in compliance with article 87 of the EU regulations concerning state investment (see also section 3.6.1.).

3.5 - The Supply of Private Seed and Venture Capital Sources

Venture capital in Italy has remained largely underdeveloped; a conclusion that clearly emerges from figure 3.3, which shows that Italy's VC investment as a percentage of GDP is among the lowest in the industrial economies. However, in recent years, and especially between 1999 and 2000, a positive growth trend was

detected. In particular, seed and start-up investments have increased from 153 in 1999 to 339 in 2000, corresponding to 130 and 244 firms respectively. This was probably due to the explosion of the Internet sector and to the privatisation of the telecommunication sector. The crisis of these two sectors in 2001 has caused a restriction of activity for both.

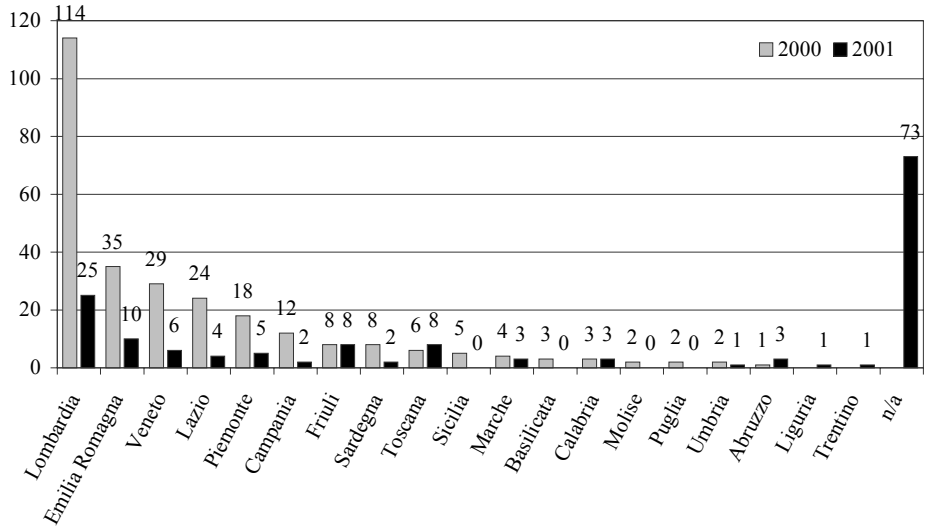
Figure 3.3 - Internal VC Investments as a Percentage of GDP



Source: GEM – Copyright © 2001, Paul D. Reynolds, S. Michael Camp, William D. Bygrave, Erkko Autio, Michael Hay and Kauffman Centre for Entrepreneurial Leadership at the Ewing Marion Kauffman Foundation. All rights reserved. In Murray, 2002

Figure 3.4 shows the investments of venture capital funds in early stages, by region of investment. It is quite clear that there is a strong bias for investment in the region of Lombardia. We reasoned that although it was shown that Lombardia has the strongest potential for innovative new firms, the concentration of VC investments there is also biased by the strong concentration of VC headquarters, which in turn is likely to be the result of most of the financial institutions in Italy being located in that area.

Figure 3.4 - Early Stage Investment by Italian VC Funds by Region (2000-2001)



Source: Gervasoni, 2002

Table 3.6 shows the distribution of VC investments in seed and start-up capital by sector (year 2000). It emerges that investments in research-intense sectors such as biotech and telecomm hardware are quite rare. They are more frequent in the Internet and telecomm carrier sectors which, as we have already mentioned, should often be considered non-high-tech in Italy. It is also worth mentioning that data relating to year 2001 and first half of year 2002 show that investments in the telecommunication and internet sectors are strongly decreasing due to the "end of the internet bubble". Most interestingly, industrial products, a sector in which Italy is supposed to have an advantage over other countries, appears to attract very little money. The industrial automation sector, in particular, which was shown to be the only high-tech sector in which Italy outperforms the European average [Modena et al, 2001], has attracted only 1% of all investment (by number) in year 2001 [Gervasoni, 2002].

Table 3.6 - Seed and Start-up Investments of VC Funds in Italy – year 2000

Sector	Amount (€ m)	Number
Agriculture	1.5	4
Financial services	29.7	20
Other services	69.6	37
Manufacturing	0.28	2
Construction	0.52	1
Industrial products	0.66	3
Consumer products	37.7	10
Internet	108.1	73
Chemistry	2.1	3
Computers	67.7	61
Telecommunications	138.0	76
Energy	2.6	1
Telecom hardware	31.7	12
Medical devices	15.4	11
Biotech	11.1	5
Other	23.1	20
Total	***539.7***	***339***

Source: AIFI, 2001

A study by AIFI[5] (2001a) aimed at assessing the perceived difficulties of Italian venture capitalists has come to the following conclusions:

(1) Only 19% of the managers surveyed were satisfied with the institutional framework for venture capital in Italy. The most common reasons for this dissatisfaction were: bureaucratic barriers, lack of specific incentives for VC and the high-tech sectors, and the tax environment.

(2) Only 5% were satisfied with the financial environment associated with the high-tech sectors. The most common reasons for this low level of satisfaction were: the lack of communication between the financial and industrial (high-tech) world, the lack of incentives aimed at lowering the risks associated with investment, and the lack of an efficient public incubators programme.

[5] The Italian Private Equity and Venture Capital Association

(3) All VC operatives feel the need for a change in the legal framework, particularly in the Board of Directors' responsibilities concerning bankruptcy law. These issues are thoroughly explained in the *Manifesto* [AIFI, 2000].

3.6 - Public Incentives to Innovative Firms in Italy

Before any new project is proposed, it is important to show that the existing ones are insufficient or inadequate to explore Italy's potential. Since not much data was available on the performance of these programmes, the discussion of their inadequacy for Italy's needs is based on their structure and the available information. Prior to this discussion, the EU regulations that affect the planning and implementation of any public support programme in Europe are briefly presented.

3.6.1 - The EU regulations

Article 87 of the European Treaty (which regulates the state incentive to risk capital) mandates that state subsidies in general not be permitted in the EU except for some specific forms of help, including: "aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest". Competition regulations heavily affect programmes throughout Europe including those that were launched in Italy; these will be briefly described in the following sections. It is important to note that a regulatory article such as the above does not rule out public support for seed and venture capital funds for grants given to SMEs. The European Commission simply requires that the authority promoting the incentive programme demonstrate that there are no negative effects on market actors who could be affected by the proposed programme. Interestingly, the Commission has issued a clarification document [Official Journal of the European Communities, 2001] in which it explains that certain situations are recognized as "market failures" (see paragraph 4.1.3 points 1 and 5), although this does not mean that they are the only conditions that may be considered to constitute a market failure.

3.6.2 - Law 297/99 and the incentives to research operated by new firms

Law 297, enacted in 1999 [law 297/99], is the main law for R&D in Italy, and it includes a special programme for new firms. The programme is dedicated to university and public researchers who decide to set up a new firm exploiting the results of their research. New initiatives are generally granted up to €516,000, plus up to 50% of the eligible R&D budget and 25% of the eligible budget for pre-competitive activities. This programme started in April, 2001. After approximately one year of operation, it had only supported 12 start-ups in all of Italy.

The youth of the program makes it difficult to analyse its efficiency. However, we can point to some basic weak points: (1) The state is still in charge of the projects' evaluation, something which is strongly not recommended for for-profit ventures (see also section 1.4. point 6). (2) Only public spin-offs are eligible beneficiaries, which excludes private industry spin-offs, the most important source of entrepreneurship. (3) The programme requires that the intellectual property rights division between the researcher and his institution be made clear before the inception of the new venture. In most Italian universities this is impossible, as such patent regulation is still in its legal - and cultural - infancy.

3.6.3 - Regional programmes

In addition to programmes regarding Objective 1 areas (see section 3.6.6.), some regions have launched programmes for fostering new enterprises. Among them are Law 35/96 in Lombardy and Law 27/93 in Tuscany. Without entering into the details of such programmes, we believe that they are not suitable to research-intensive start-ups. The main reason for that is they all grant a maximum of €100,000 over three years, which in itself is not a suitable sum to set up a new high-tech company (Israeli incubators, for example, grant as much as $350,000 for two years). This sum of €100,000 is defined by EC regulations as the limit below which there is no need to ask permission of the *DG Competition* for programme implementation.

3.6.4 - European programmes

The European Investment Fund (EIF), which represents the European Central Bank for risk capital, has recently launched various incentives for the risk of capital on

enterprises which are already operational in Italy [Gazzetta Ufficiale, 2002]. Apart from minor guarantee schemes for small enterprises, the fund participates in regional funds dedicated to SMEs. The EIF invests under the same conditions as the private investors, with shares between 10 - 25% and a maximum of €10 million per fund [Website EIF, 2002]. We argue that investments at the "private conditions" level provide very little incentive to other private investors to participate in the proposed fund. Indeed, the participation of a public entity in a fund is not *per se* an incentive, and does not help in convincing the private investor to enter high risk ventures such as those in depressed areas or seed investments for high-tech initiatives.

Another programme concerns the contribution towards the hiring of qualified managers for venture capital funds. Contributions in this case reach €100,000 per manager, up to a maximum of €300,000; in any case for not more than 5% of the fund's budget and no more than 50% of the management company's expenses. Although interesting, this programme appears too weak to convince investors to direct their funds into high-risk firms.

Obviously, new high-tech enterprises are also eligible for the EU framework programmes from which they can obtain R&D grants. However, it is known that delays in EC approval of proposals and payments can easily stretch to several months, and new companies are often required to renounce the advance payment. Such adverse conditions can be fatal to small companies dealing with severe cash constraints and the need to produce their product ahead of competitors. Another drawback of new firms' participation in the framework programmes is that the public sector still acts as the decision-maker for investment.

3.6.5 - The Startech programme

Startech is a national Italian programme which gives both consulting services and seed capital to new technology-based firms. It operates through the temporary acquisition of equity in the investees' firms, up to 49% (and not more than €516,000) of the budget, which shall not exceed €2.5 million. Divestment shall happen within three to five years. Startech activities are implemented through the collaboration of universities, research centers, and large firms, and with the participation of the *Sviluppo Italia* territorial system.

Since September 2001, the experimental programme has generated significant interest, with over 150 proposals received in the first six months. However, it was suspended in February 2002 due to agency reorganization. The programme is supposed to start again soon, with the vision that private banks will be allowed to take part in the Startech Capital Agency (which makes the investment), thereby allowing private sources to be involved from the beginning in the project. At the time this document is written, September 2002, the amended programme has not started yet. While it is impossible to judge a programme that has not yet begun, it is worth noting that once again, in this case the state becomes an active investor.

3.6.6 - Laws 95/95 for the incentive of juvenile entrepreneurship

This law supports the creation of new enterprises, provided that the founders are young and that the firm is set up in one of the areas designated as economically depressed. Contributions are very generous; they can reach €2.5m and up to 90% of the budget in Objective 1 areas (basically, the south of the country). Firms operating in the fields of industry, agriculture and services are eligible for the benefits, although innovative firms are preferred.

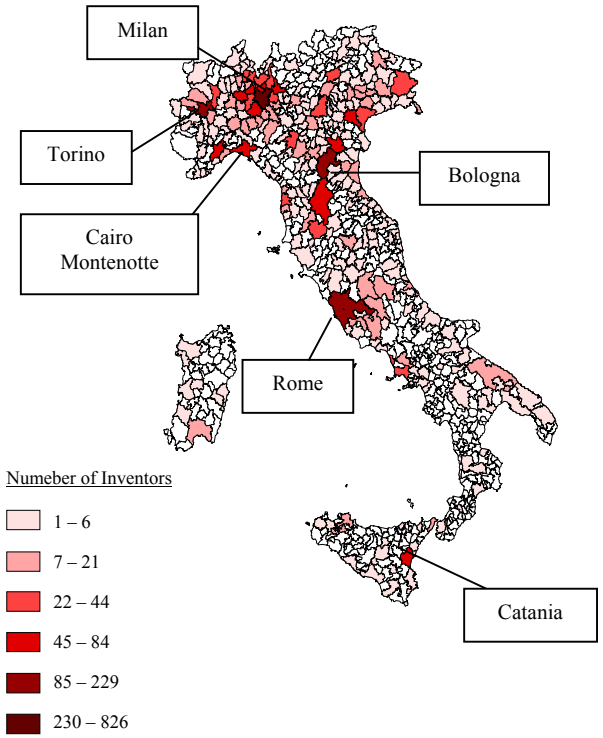
In this case we find a generous programme, able to insert large amounts of money into the new ventures and dedicated to regions where the potential for high-tech start-ups is the country's weakest. This picture clearly emerges from Figure 3.5, which shows the map of the main Objective 1 regions on the one side, and the concentrations of inventors (individuals who have filed at least one patent in a high-tech sector), on the other.

The IFISE team reasoned that while it is highly desirable that private equity funds be found in depressed areas, high-tech sectors can only blossom in those regions where specific background conditions exist. Special programmes should be dedicated to the latter, which take their particular needs into account (such as Projects 1 and 2 in sections 4.2 and 4.3). Depressed areas should be helped in attracting private capital for whatever sector has the potential (or the local advantage) to blossom within their boundaries. This consideration has lead to proposing Project 3 (section 4.4).

Figure 3.5A - Main Objective 1 (depressed) Areas

Main Objective 1 (depressed) Areas

Figure 3.5B - Concentration of Inventors



Source: University of Pavia Elaboration on EPO data

CHAPTER 4

A PROPOSAL FOR SEED AND VENTURE CAPITAL SCHEMES IN ITALY: FOUR PROJECTS

4.1 - General Planning Orientations

This chapter presents the four projects which have been proposed to Italian policy makers for the establishment of seed and venture capital sources in Italy.

After defining the principles and guidelines necessary for planning, and having analysed the potential of the high-tech sector in Italy, the IFISE team planned for efficient seed and venture capital sources by means of the following courses of action: (1) The principles extrapolated from the Israeli and European practises were recombined and applied to the Italian reality. (2) Proposed programmes were discussed by means of intensive brainstorming with the participation of experts such as Dr. Rina Pridor, director of the Technological Incubators Programme, and Mr. Yigal Erlich, initiator and director of the Yozma Programme. (3) Finally, programmes were submitted to Italian policy makers and modified, taking their comments into account.

In each project presentation, the reasons for choosing the specific tool are first presented, after which the programme and the main rules for its proper functioning are explained. Before presenting our proposals, we shall summarize some general guidelines that have been used in the planning process. The planning process has been directed and its conclusions drawn by Mr. Vittorio Modena, IFISE project coordinator (see also Modena [2002]).

1. Locational aspects

As was shown in section 3.2, most of the potential for research-intensive companies is found in the north and centre of the country. In some of the central and northern regions like Lombardia, there is more venture capital activity, in others less (Tuscany); all of them suffer from a lack of seed capital for research-intensive firms. In the southern regions, potential for high-tech firms is considerably lower, although the presence of possibly excellent research groups is not excluded. In these southern regions there is on the one hand very scarce venture

capital activity, and on the other, great availability of public funds. This has brought us to suggest that the high-potential regions should be strongly considered for dedicated programmes for the creation of venture capital funds dealing with research-intensive firms, whereas Objective 1 areas should be granted incentives for funds working in all industrial sectors. This reasoning led to the formulation of **Project 1 for high-potential regions** and **Project 3 for depressed regions** (sections 4.2 and 4.4). It should be mentioned that the disadvantage of depressed areas was taken into account, as both the constraints regarding investment in research-intensive firms and those regarding seed investment do not apply for Project 3.

2. Sectorial aspects

As was shown in section 2.4.-4, if there is no specific reason to encourage specialized funds, it is better to allow the market to shape the formation of the new VC funds. This is the case for Projects 1 and 3 (section 4.2 and 4.4). An exception was made for the biotech and pharmaceutical sectors, which were dedicated a specific project. It is worth noting that other sectors such as industrial automation seem to have attracted very little investment in spite of their considerable presence in Italy. However, this was not considered a sufficient reason to dedicate a special programme for them.

3. Conformity with EC regulations

Projects 1 and 3 presented here would certainly be subject to article 87 of the European Treaty (see section 3.6.1). In this respect, if any of these programmes are to be adopted, it will be necessary to demonstrate that these incentives are in fact responding to a common interest and that they do not harm any market actors. This "market failure" demonstration may vary according to the sector and the geographical area for which it is aimed. Some of the facts and data that were gathered in the framework of the IFISE project may be useful for this purpose. In particular:

1. Investment in early stages (seed capital) of the high-tech start-ups is widely considered in literature as a segment where public intervention is needed. It is worth noting that the EC accepts that economic phenomena are at the base of the frequent market failures found in innovative enterprises: e.g., imperfect or

asymmetric information, or transaction costs. The former is related to the difficulty encountered in finding reliable information on sophisticated high-tech markets, the second to the high costs associated to the evaluation of innovative and small firms [Official Journal of the European Communities (2001)].

2. In some regions there is a marked lack of venture capital investments (see section 3.5).
3. In some regions the potential for new high-tech firms seems to be higher than the available VC resources would suggest.
4. In the case of biotech there is a clear gap between the potential of the sector and investments being made (see section 3.4). Furthermore, it appears that private investors are particularly reluctant to enter the initial phases of biotech-pharmaceutical product development.
5. Generally, the European Commission considers in a positive light many of the scheme characteristics adopted when developing our projects: (a) that schemes be aimed at certain regions and certain enterprises; (b) that beneficiaries be small or micro-enterprises; (c) that decision making regarding funds be done by profit-oriented teams; (e) that beneficiaries be more than one fund or firm, and that the scheme be launched by means of a public call for tender; (f) that the private investors be represented in the decision making body and that there be quality and timing objectives; and (g) that a monitoring facility of the whole scheme be set up [Official Journal of the European Communities (2001)].

4. The Italian legal framework and institutional aspects

The IFISE team has detected both a lack of coordination between the various support systems for innovation, and the current institutional framework's difficulty in setting flexible and complementary programmes which form the basic characteristics of an efficient innovation policy (see section 1.4 - 2). The necessity for coordination of the relevant measures has brought to the formulation of Project 4.

As for the legal framework relating to risk capital and start-ups, the IFISE team shares the concerns expressed by the AIFI's *Manifesto* [AIFI, 2000] regarding the responsibility of the Board of Directors in cases of bankruptcy. The reader is advised to consult that document for further details.

The next section will present the four projects that are being proposed to Italian policy makers:

1. Rotational seed capital funds for new high-tech companies in regions with high potential.
2. Biotech-pharmaceuticals incubators.
3. VC funds for depressed regions.
4. A coordinating institution for high-tech industries incentive policies.

4.2 - Project 1. Rotational Seed Capital Funds for New High-tech Companies in Regions with High Potential

4.2.1 Motivations behind the project

1. A clear distinction was made between the general concept of “innovative companies” and the more specific one of "high-tech firms". High-tech firms can be distinguished by very intense research activity and by the very steep expenses they face in order to realize prototypes of their products. Despite hosting a very large number of innovative companies, Italy falls short in regard to research-intensive ones (see section 3.1). The aim of this project is to encourage the creation of new research-intensive firms.
2. Seed capital must be available in a generous and continuous manner (see section 2.4-1). Indeed, it was in shown that even in countries where a large amount of venture capital is present, companies face both the lack of seed capital and the need for governmental action. Therefore, it was decided that the best way to guarantee a continuous income of funding is with rotational funds, in which governmental support must be renewed every four years.
3. It was noticed that in Israel, both seed capital funds and technological incubators provide support to many different sectors, and that specialized incubators perform as well as the non-specialized ones (see section 2.4-4). In addition, it was mentioned that Italian industry does not specialize in high technology sectors (see section 3.1). For these reasons it was decided that all industry fields should be dedicated the same instrument, with the exception of the biotech industry, for which a special project was developed.
4. In Italy some incubators exist, but very few of them disburse grants to the high-tech industry. They do provide some consulting and physical space to new companies that specialize in research, but this in itself is not enough to overcome a number of the major obstacles to fully establishing a new firm. Space availability is not a crucial element for start-up support; instead, what matters most is the availability of funds. Therefore, existing Italian incubators shall be allowed to request government funds, so as to be able to offer seed capital to their firms as well as current incubator opportunities.
5. Despite the above considerations concerning space availability, physical

proximity between the investing fund's management and its entrepreneur is of great importance, as it is the key to communication between the two parties.

6. It was noticed that most of the venture capital funds in Italy are concentrated in the Milan area, even though other regions have significant potential.

7. A different plan was created for the economically depressed areas (see Project 3, section 4.4). Given their lack of high-tech resources, the above requirements would not be adequate for these regions.

4.2.2 - Project outline

The Project has the following objectives:

1. To create efficient funds of risk capital for the high-tech industry in high potential regions.

2. To give the opportunity to interested entrepreneurs to develop companies with intense research activity in any high potential region.

3. To strengthen the deal flow of high-tech initiatives for venture capital funds which currently exist in Italy.

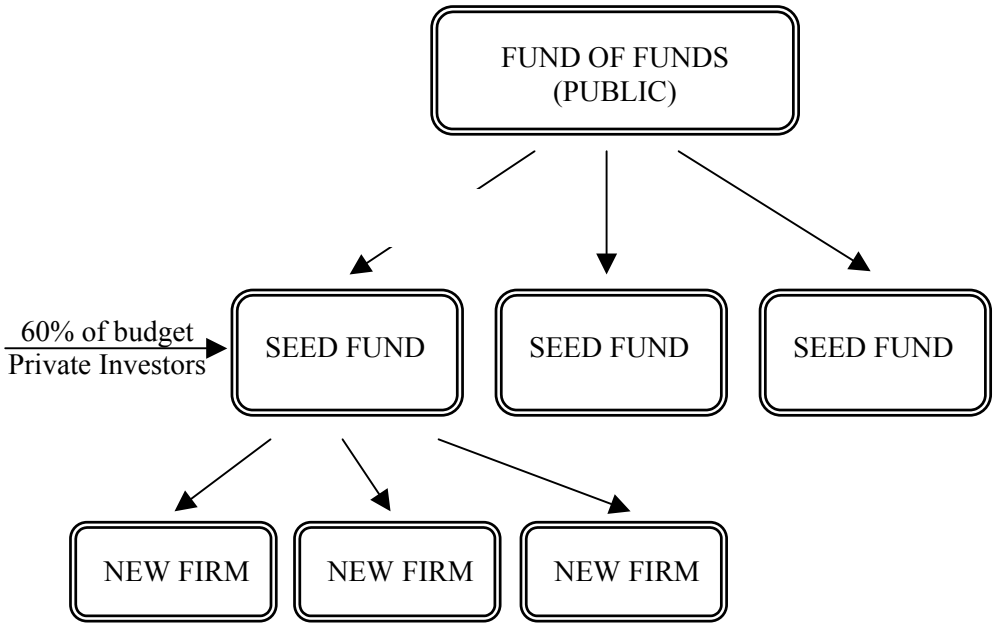
It will be necessary to create an autonomous *fund of funds* of investments dedicated to the new high-tech companies (research intensive firms). This fund of funds will invest up to 40% of the new seed funds' budget and give private investors the option to buy back its shares, at the original price plus the inflation rate, for a period of six years from the creation of the fund. The general scheme is depicted in figure 4.1.

In addition, management companies working at the seed funds will be entitled to a grant of €200,000 and to up to 50% of their budget for the first four years of work, plus up to 25% of their budget for the following two years. The program is repeated every four years, so that seed capital funds can always be available for new ventures.

A fund of funds of this type should be set up in any Italian region that shows potential for the high-tech industry. The dimension and number of such funds would vary according to the potential of each region. To give an example, in Lombardia, the Italian region with the highest potential, eight to twelve seed funds could be created. The typical dimension of each seed fund would oscillate between €20-40 million, and the investment of the fund of funds would not exceed €10

million per individual fund and 40% of its budget (whichever figure is lower). Regional authorities would monitor the program and the funds' operation.

Figure 4.1 – Scheme for Public Incentives to Seed Funds



In order for the management companies to have access to incentives as charted above, their investments will be subject to specific rules:

1. Investments shall be made in new firms. The definition of a new firm will be decided by the fund of funds' management. A possible definition could be that of a "microenterprise" which, according to the European Commission, is a company with annual revenues of less than €7 million, or a balance sheet with less €5 million, and less than ten employees [Web-Site Definition of SMEs, 2002].
2. Investments in a single company should not exceed some percentage of the fund availability (for example, 20%).
3. The seed fund should invest in more than five companies and in less than twenty.
4. The seed fund should invest at least half of the available capital (first round) within four years, and all of the available capital within eight years.
5. The seed fund should invest in companies that reside and are developed in Italy

(or in the region from which the funds originate). This rule can be overcome by payment of a penalty (for example, a sum equal to 200% of the government share invested in the project).

6. Investments must be made in research-intensive firms. A special commission will set the criteria to distinguish high-research companies from non-high-research ones. An example of a high-research company is one in which at least 50% of the expenses are dedicated to research and development. For R&D expenses' definition, precise terms should be used. An example of such terminology could be the definitions included in the Frascati Manual [Website Frascati handbook, 2002].

7. The entrepreneur's share has to be large enough to keep him interested and motivated for the success of the project. For example, a minimum of 20% of the new company's shares should belong to the founder or group of founders, until the company has attracted investments for €1 million.

4.2.3 - Requirements for seed funds' management companies

1. Existing incubators are qualified for investments and encouraged to participate.
2. The seed fund's manager should have experience in research as well as in high-tech industry. He or she will be employed full-time.
3. There will be a second member of the management company, namely someone with experience in corporate finance.
4. Sectoral funds are eligible entities. They will have to prove that they have experience and connections in the field.
5. The seed fund should prove that it has at least one foreign investor (which must be an expert in the high-tech industry).
6. The seed fund should prove that it has at least one investor with experience in industry or finance.
7. University funds are encouraged to participate. However, their decision making process shall be independent from that of the university's administration.

4.2.4 - Additional criteria for the selection of the management company

In addition to the above-mentioned requirements, management companies will be selected according to the following criteria:

1. If a company requests government aid for a second fund, a commission will

analyse the accomplishments reached by the company in the framework of its first fund.

2. Experience and skills of the management company.

3. Networking skills with the high-tech industry, technical universities and VC funds associated with the management company and/or the private investors in the fund.

4. VC participation in the seed funds will be seen as a figure of merit.

4.2.5 – Fund of funds' role and monitoring

1. The supporting region will provide 2% of the program's funds for the monitoring of the program and for the study and revision of the rules on which the program is based. The program will be reviewed every four years.
2. The fund of funds will not participate in any decision regarding investments, nor the investments' administration.
3. The government will monitor the program so as to ensure that investments are made solely in new research-intensive firms and not in new companies with little research activity.
4. Monitoring of the investments' legality will take place in two ways: (a) a representative of the fund of funds will participate in funds' meetings to make sure that the investments' requirements are complied with. However, the representative, who should have a strong background in technology, won't be influential on any business decision for the fund; (b) after four years from the initial investment, he or she will check that the funds were actually invested in the high tech industry. To do so, they will follow specific pre-defined criteria. The program's success will be evaluated by benchmarking the success of the companies in which the investments were made. Such a process will take place after four years from the beginning of the program and every four years from then on.
5. Private funds will be able to free themselves from governmental monitoring by: (a) buying all of the government's shares and transforming the entire fund into a regular private one; or (b) paying the government twice the money it had previously invested in a single project, hence freeing that specific project from government monitoring.

4.2.6 - Qualified supporting institutions

Institutions qualified to support these programmes may be banks foundations, Sviluppo Italia (the Italian development agency), the European Investment Fund or any combination of them.

4.3 - Project 2. Biotech-Pharmaceuticals Incubators

4.3.1 - Motivations behind the project

The IFISE project is recommending the Biotech-pharmaceuticals incubators for the following reasons:

1. The biotech industry is growing very rapidly, creating room for new initiatives.
2. In Italy there is unexploited potential, especially in terms of academic spin-offs.
3. Biotech initiatives need special infrastructures and have special requirements in order to succeed. For this reason physical support will be needed along with financial support.
4. Compared to other companies, biotech companies need larger public funds and more time before they are able to attract substantial private investments [see also Kaufmann and Levin, 2001].

4.3.2 - Basic facts and guidelines used for planning

1. Entrepreneurs in the biotech and pharmaceutical industry usually have an academic background, and therefore prefer to be close to universities.
2. In Italy there is low potential for spin-offs originating from the industry (since very little research is conducted within the industry itself); on the other hand, there is potential for spin-offs from the public research.
3. Researchers working in the industry are linked to their companies in terms of copyrights for new discoveries. It is therefore improbable that many new industrial spin-offs will be created.
4. For the three reasons cited above the biotech incubator should be in proximity to a university and have a collaboration contract with it. However, the decision making body of the incubator won't depend on that of the university.
5. Biotech projects will have the right to receive a larger amount of support from the government and to stay longer in the incubators than other high-tech projects. However, a limit shall be fixed for their stay.
6. Three types of equipment are generally utilized by the biotech companies: (1) equipment employed daily, which single companies will buy; (2) occasionally employed equipment, usually purchased by the incubator, and (3) expensive and exclusive equipment, which companies will rent from larger facilities

(such as universities or research centres). The incubator will also be used to reach a critical mass for the purchase of occasionally employed equipment. It should host a laboratory provided with such equipment (as explained in 2.2) to be used for projects inside the incubator.

7. Large corporations will be encouraged to participate in acquiring part of the incubator's property. However, they won't be allowed to hold a majority of shares nor decisional power, in order to avoid the temptation/danger of their taking control or advantage of the ideas promoted by the incubator.
8. This programme shall be conducted at the national level, since few centres of excellence are present within all of Italy.

4.3.3 - Programme definition and incentives

Biotech incubators have the objective of creating integrative and effective development tools able to provide the new entrepreneur with the essential funds, space, consulting and equipment necessary for setting up a new company in this field. Each incubator will be managed by a private management company. Both the new firm and the incubator's management company will be granted financial aid. The programme will be established as follows:

1. A total of six incubators should be created in Italy. Selection of candidate incubators and their monitoring will be done by a public agency constituted ad hoc.
2. Projects should be chosen according to their quality and success (in terms of profit) potential.
3. The budget for infrastructures (buildings excluded) should exceed €2 million. The public grant will amount to up to 50% of the approved budget and to up to €2 million.
4. The grant per project will amount to up to 50% and to up to €1.5 million for the first four years. Two years after the project begins, a special study will determine whether support for the project should continue or should be dropped.
5. Management companies of the incubators will be entitled to a grant of €150,000 per year and to up to 50% of their budget for their first six years of operation.

4.3.4 - Investment rules

1. The incubator will accept projects from any source (be it an adjacent university or not).
2. Investments should be made in new projects. Projects must have the specific objective of producing new products; they cannot be intended for the production or marketing of existing ones.
3. Investments in a single project should not exceed 25% of the incubator's budget. Four years after its creation, the incubator will be handling more than three projects, but less than fifteen.
4. The incubator must invest in projects that are located in Italy, and the projects will remain within Italian territory. However, if the incubator will pay the government double the amount that it had originally received for the project, it will be free to sell the project and/or the scientific knowledge to the foreign market.
5. The inventor of the product must dedicate at least one full day per week to the new firm.
6. The project leader (be he the inventor or a professional manager) will have to dedicate at least 50% of his time to the project (the closer to 100%, the better).
7. Incubators shall be networked, and share functions such as publicity and a database of expert evaluators.

4.3.5 - Qualified management companies

1. The incubator should be placed in one of the cities that will be judged as having a critical mass of potential entrepreneurs. For this purpose both the academic researcher present in the adjacent university and local industrial activity will be taken into consideration (see Modena, 2002; for data on R&S activity).
2. The management company will be owned by a group of private investors who will hold the majority of the shares. This management company will have to show that it has the necessary funds to complete the public funding, both for the incubator's operations and project financing.
3. The management company will provide physical space for the technological incubator (an area of no less that 800 square meters).
4. The incubator's project will include the purchase of equipment for projects

within the incubator.

5. The incubator should be located in the vicinity of one of the universities that was considered to have potential within the biotech sector (according to precise and empirical indicators; see for example Modena, 2002), and should create cooperative agreements with that university.

6. The incubator should prove that the infrastructures necessary for the projects are found in its vicinity (aside from the incubator's own equipment).

7. Should the university own or manage part of the incubator, its shares should not exceed 30%, and should remain as a minority share.

8. The incubator must respect bioethical laws.

4.3.6 - Selection criteria for management companies

1. The nature of the contract (described by a letter of readiness) with the university.

2. The experience and skills of the management team.

3. The ability of the management team to network with the pharmaceutical industry and the realm of finance at a national and international level.

4.3.7 - Role of the central agency and monitoring

Once the incubator is established, it will submit to the central agency the proposed initiatives as they become available. The agency will check the conformity of the proposals and will give its approval within sixty days. Moreover:

1. A representative of the public administration will be a member of the Board of Directors of each incubator. He or she will not have any influence in the business decisions of the incubator, but will simply verify that all of the programme investment requirements are met.
2. Two percent of the budget for the biotech incubators' program will be utilized to monitor the initiative. The monitoring will take place in two distinct stages:
    a. Each incubator's work will be checked by an external expert every four years.
    b. Every four years, by means of an independent research study, the program will be subject to analysis, and eventually modified.

The agency will also be responsible for publicizing the programme throughout the large national and international corporate community.

4.3.8 - Possible launching institutions

The program should be carried out on a national level. This is because university research centres are widely spread around the country. A national program for the creation of biotech incubators could be supported by one or more of the following institutions: the Office of Higher Education, the Office of Industry, Sviluppo Italia (the Italian Development Agency), and/or the Office of Innovation, Development and Technology.

4.4 - Project 3. VC Funds for Depressed Regions

4.4.1 - Motivations behind the project

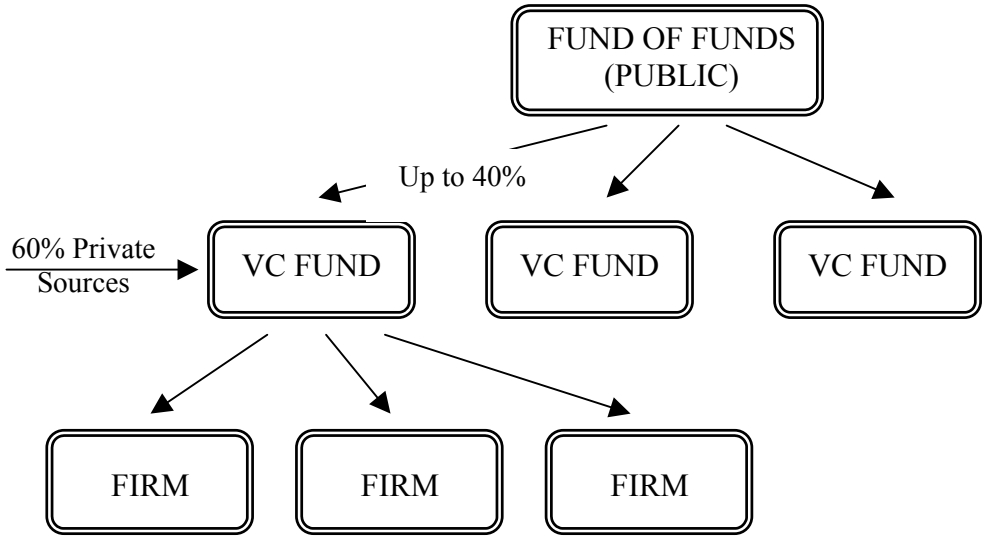
The discussion of how to develop an economically depressed region brought up the following points:

1. In poor regions, and particularly in Objective 1 regions, large amounts of public funds are available for any entrepreneurial project. Most of these funds are provided by the European Commission.
2. Venture capital funds in Italy do not serve Objective 1 regions. Indeed, in 2001 only 7% of investments (representing 2% of the capital invested) were made in the southern and island regions. Some regions have seen no investment at all.
3. In general, there is little potential for research-intensive spin-offs in these regions.
4. Most often, an entrepreneur prefers to use public funds instead of seeking private ones, since in the latter case he/she would have to give up part of his/her company shares. It is hard for the private investors to compete against the public sector; therefore they become reluctant to invest in such areas. It is our belief that, in the long run, the public sector should decrease its funds, so as to give space to the private investors.

4.4.2 - Description of the proposed project

The project aims at creating venture capital to be invested in any (low tech and high-tech) industrial sector. Once the initial difficulties are overcome, hopefully there will be more and more private investments, so that in the long run the funds will remain active without needing further public support. The general scheme will be the same as that used for seed capital funds, as shown in figure 4.2.

Figure 4.2 - Public Incentive Scheme for Investment Funds in Economically Depressed Areas



Regional funds of funds should be created. They should invest in privately managed VC funds up to 40% of their capital and up to €20 million, allowing the private investor to buy back public shares at their original price. VC funds will conform to the following rules:

1. VC funds for economically depressed regions shouldn't be limited to high-tech sectors, since potential in these regions is limited. For this reason, funds will be invested in any sphere of industry, including the more traditional ones.
2. Funds will be managed by private companies.
3. Investments won't be reserved for new companies only, but will be available to currently existing ones, in order to foster their rapid improvement. Investee companies shall be small and potentially high-growth.
4. Up to €5 million can be invested in each firm by the VC fund. The fund will have to invest in at least four, but not more than fifteen, companies.
5. The programme operation will be limited in time. A competition for funding will be announced by the supervising institution and will remain open for 5-6 years. If the programme fails in creating venture capital, then a second competition will be considered. Nonetheless, it is important to point out that VC funds for more traditional spheres of the industry are economic activities that do not need incentive

on a continuous basis. The program should therefore be completed within 5-10 years from its beginning date.

6. The number of funds will depend on the size of each region and its demand for equity capital.

4.4.3 - Qualified management companies

Qualified management companies with a management team expert in the industry will be able to participate.

4.4.4. - Rules of investment

1. Investments must be made exclusively in companies located in Objective 1 regions.

2. Investments in any field of industry are encouraged. Investments in real estate, however, are excluded.

4.4.5 - Monitoring

A representative of the fund of funds will participate in Board of Trustees meetings in order to verify that the nature of the investments conforms to guidelines, but he/she won't be allowed to influence any commercial decision. His approval will be essential to the investment decision.

4.4.6 - Possible launching institutions

It was concluded that this project would be more successful if managed on a regional level. The regions with depressed economies would have easy access to financial support from European funds (from Structural Funds, for example). The regional fund of funds should be managed by a special regional agency.

4.5 - Project 4. A Coordinating Institution for High-tech Industries' Incentive Policies

This research has shown that in a field as demanding and as fluid as that of high-tech, it is important that a competent and powerful institution take control of the situation (see section 1.4.2.). In Israel that institution is called the Office of the Chief Scientist. It is a governmental agency with approximately 20 full-time and over 50 part-time workers, all with high-tech or financial backgrounds. The agency has the power to create, stop or modify any public program for the high-tech industry.

In Italy, a similar agency should be created. The agency should be able to:

1. Disburse governmental funds to the high-tech industry without the need for any additional governmental permission, even with a budget as large as €200-300 million.
2. Conduct national and international studies to understand market trends.
3. Be updated on national and international market trends by means of internal or external expert surveys and studies.

4.6. - Recommendations for Future Research and for the Definition of Innovation Policies

For a better definition of innovation policies, it is recommended that researchers and policy makers consider the following actions:

- Identify both the success factors and the failure points of the many European VC and incubator programs so as to comprehend the vast field of possible situations.
- Be aware of a region's potential when planning for it.
- Set different goals for projects in depressed regions than those for projects in regions with high potential for high-tech, unless they coincide.
- Identify and research market failures in the high-tech industry, so effective programmes can be set up without repeating mistakes. In line with this recommendation, it is important to develop more and better innovation indicators (for example, those regarding scientific publications are not sufficiently disaggregated for sector and geographical area).

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