

# 1

## Financing Entrepreneurial Firms in Europe: Facts, Issues, and Research Agenda

Laura Bottazzi and  
Marco Da Rin

### 1.1 Introduction

The success of entrepreneurial companies in the United States since the 1980s created a wide gap between America and Europe in terms of their ability to compete in a knowledge-based economy (European Commission 2000) and to commercialize high-tech products (European Commission 2001). European policy makers have been looking for appropriate policies to close such a gap. In particular, they have been looking for policies that could exploit the ability of innovative companies to create jobs (Schreyer 2000). The 1998 *Risk Capital* Communication of the European Commission and the ensuing Action Plan have provided the main policy framework, which rests on the idea that the most effective way to spur entrepreneurship is to reduce capital and labor market imperfections; it also stresses the need to create stock markets targeted at high-growth companies in a drive to spur the supply of risk capital for the financing of entrepreneurial firms, which are subject to stricter credit constraints than established firms, especially in riskier, high-tech industries (Guiso 1998).

During the latter part of the 1990s, some important changes dramatically transformed the prospects of European entrepreneurial firms. First, the introduction of the euro and its consequences at both product and financial market levels substantially advanced the creation of a truly European economic area. Second, the supply of venture capital in most EU countries dramatically increased, providing unprecedented access to risk capital financing for entrepreneurial companies. A third major change in the European context was the creation of several new equity markets targeted at innovative firms. Finally, policies toward the financing of entrepreneurial firms saw a renewed spurt. For example, several countries introduced more favorable treatments of capital

gains. Also, the conversion of the European Investment Fund into a major investor in venture capital funds committed a large EU budget to the venture capital industry.

These changes are potentially very important. Studies based on U.S. evidence have shown that venture-backed companies are more effective innovators (Hellmann and Puri 2000, Kortum and Lerner 2000). The lack of a well-established venture capital industry has therefore been identified as a major cause for the paucity of European “star” entrepreneurial companies. Also, European stock markets have traditionally been unwelcoming of young companies without an established track record (Pagano, Panetta, and Zingales 1998; Rydqvist and Högholm 1995). Venture capital and the new markets are also likely to sustain each other, as stock markets provide venture capital with a viable exit option from their investments (Black and Gilson 1998). In this Chapter, we document these developments and put them into perspective.

First, we look at facts. We gather and analyze new evidence on European venture capital and on Europe’s new stock markets that builds on Bottazzi and Da Rin (2002a). Second, we ask what these changes mean for the financing of European entrepreneurial firms and provide a rigorous assessment based on microlevel data. Third, we elaborate on our findings to devise a research agenda that takes into account the important role public policy plays in shaping the incentives for entrepreneurs, venture capitalists, and investors.

## 1.2 Facts

For European entrepreneurial companies, the 1990s saw unprecedented changes in the availability of financing sources. In this section we extend our previous findings presented in Bottazzi and Da Rin (2002a, 2002b) to include new data up to 2002, thus documenting the effects of the recent market slump.

In the 1990s, two major developments offered unprecedented funding opportunities to European entrepreneurial firms. Since about 1995, the inflow of venture funds has increased at an impressive pace, and early-stage financing has become a sizable fraction of European venture investing for the first time. At about the same time, Europe witnessed the opening of several stock markets that aimed at emulating NASDAQ in providing a listing outlet for innovative, high-growth companies. We examine these two facts in turn.

### 1.2.1 *The Coming of Age of European Venture Capital*

Table 1.1 shows the evolution of venture capital fund-raising and investments from 1995 to 2002 in the United States and Europe. Although fund-raising had increased at a similar pace in the two economies until 2000, when it was about ten times as large as in 1995, it diverged in the last two years. Notably, and somewhat surprisingly, venture investment has come close to a halt in the United States, where it has gone below its 1995 level. Europe, by contrast, shows more resilience, and its fund-raising remained substantially higher in 2002 than in 1995. Still, the United States remains the largest industry in terms of investments and capital under management. The resilience of Europe is all the more surprising as we know that its financing comes largely from financial institutions, which one would expect to be particularly reluctant to invest during a major market downturn. Another sign of the maturation of the European venture capital industry can be read in Figure 1.1, which compares the share of early-stage funds in the two economies. Early-stage investments, which comprise seed and start-up financing, provide a genuine measure of the amount of funds entrusted with the riskier ventures. The figure shows how cautious European venture capitalists were until recently, so it is remarkable that since 1999, the share of early-stage investments has been higher in Europe than in the United States, where it has gradually fallen.

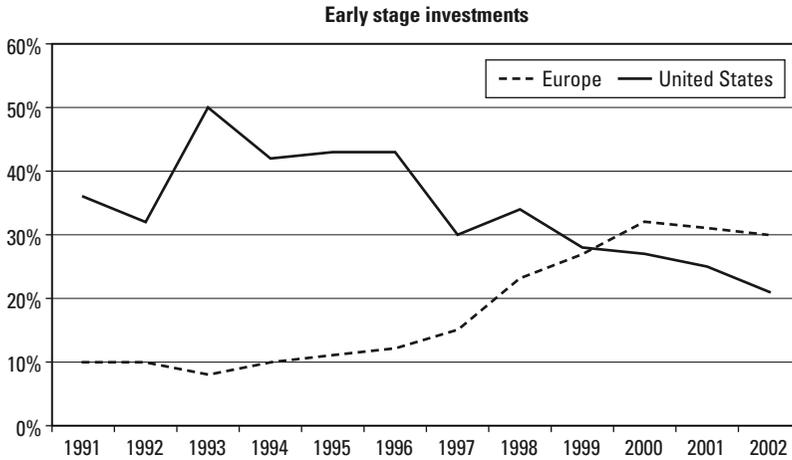
Another important sign that the changes in European venture capital are truly structural is given by the increase in the sheer number of

**Table 1.1**

Venture capital funds raised in Europe and the United States (millions of current dollars)

	VC funds raised		VC Investments	
	Europe	United States	Europe	United States
1995	\$ 5,682	\$ 9,930	\$ 3,952	\$ 7,371
1996	10,044	12,420	4,652	11,903
1997	22,456	17,600	5,388	16,063
1998	23,366	30,740	7,636	21,460
1999	27,037	58,810	12,623	54,437
2000	45,540	104,880	19,516	105,910
2001	34,216	40,270	11,985	40,619
2002	27,533	7,670	9,840	21,274

*Source:* Authors' calculations on EVCA and NVCA data.



**Figure 1.1**  
Venture capital early-stage investments

venture capital firms (see Bottazzi and Da Rin 2002a). We can confidently say that a critical mass of venture capital firms is now operating on this side of the Atlantic. At the same time, more than doubling its ranks in just three years means that substantial learning by doing may be taking place and that venture capital is still an infant industry in Europe. These facts raise an important issue: What role does venture capital play in Europe? For instance, studies based on U.S. data document the involvement of venture capital in providing companies with screening, monitoring, and mentoring services (Gompers 1995), which are reflected in faster professionalization (Hellmann and Puri 2002), stronger innovation (Kortum and Lerner 2000), and higher growth rates (Jain and Kini 1995). Are the younger European venture firms providing the same type of services, or are they mainly leveraging the financial expertise of the nonventure private equity houses they often come from? We will return to this issue in the last part of this chapter.

### *1.2.2 The Creation of Europe's New Stock Markets*

The other major change for European entrepreneurial companies has been the creation of new markets for high-growth companies on the model of NASDAQ (see Bottazzi and Da Rin 2002b). More than a dozen of these markets have opened since Easdaq was created in 1996. The new markets were highly praised by policy makers for constituting a

positive structural break in the European financial landscape, only to be blamed for many of the excesses of the late 1990s as soon as it appeared how substantial these had been. As it is often the case, the reality is more complex than its popular rendition. Table 1.2, for example, shows the uneven performance of these markets in terms of attracting a critical mass of listed firms and a sustained turnover. The three markets that performed consistently in terms of new listings, market capitalization, and turnover have been the Nouveau Marché (Paris), the Neuer Markt (Frankfurt), and the Nuovo Mercato (Milan). In the rest of this Chapter, we therefore focus on them. Table 1.3 documents the evolution of initial public offerings (IPOs) since the opening of these markets. It is clear that they have greatly suffered from the progressive deterioration of market conditions. The number of IPOs by nonfinancial companies dwindled in 2001 and came to a halt in 2002. Interestingly, while the number of delistings of companies has increased over time, it is still well below that of NASDAQ, where exit is much more common than entry in downturns. In this sense, the current shortage of listings does not constitute a concern. These three

**Table 1.2**  
Europe's new stock markets

New market	Opening year	Listed companies	Turnover	Market capitalization
Athens	2001	1	NA	50
Amsterdam	1997	7	NA	268
Copenhagen	2000	13	1,400	1,000
Dublin	1997	4	NA	34
Frankfurt	1997	337	4,190	50,000
Helsinki	1998	13	NA	437
London (TECHMark)	1999	246	35,000	690,000
Madrid	2000	13	NA	17,000
Milan	1999	45	1,790	13,000
NASDAQ Europe	1996	50	140	8,000
Nordic New Market	2000	55	190	301
Paris	1996	164	670	15,000
Stockholm	1998	22	NA	291
Zurich	1999	15	1,200	4,000

*Note:* Authors' calculations from stock exchanges data. Financial data in millions of euros. Turnover is monthly average turnover during 2001. Companies listed and market capitalization are values at the end of 2001.

**Table 1.3**  
Number of IPOs on Europe's new stock markets

	Listings	Delistings	Stock
1996	15	—	15
1997	31	—	46
1998	87	—	133
1999	174	1	306
2000	214	6	514
2001	19	21	512
2002	3	34	481
Total	543	62	

*Source:* Authors' calculations. Financial companies are excluded. Stock at end of the year.

markets have in fact contributed substantially to the financing of European entrepreneurial companies, which raised more than 30 billion euros in capital.

The growth of venture capital and the opening of the new markets are not independent events. In particular, these markets have created a large exit opportunity for venture capitalists. Nearly 60 percent of the listing companies are venture backed, and on average more than one venture capitalist is present. Moreover, Bottazzi and Da Rin (2002a) show that an increasing number of the companies that list on a new market are born with venture capital financing. This suggest that European firms may benefit from venture capital especially as a means of overcoming credit constraints, as argued by a recent survey conducted by the European Venture Capital Association (2002a), which reports that 95 percent of the respondents indicated credit support as a main benefit of venture financing. It is therefore intriguing to ask what the true defining traits of European venture capital are in terms of its role toward entrepreneurial firms. In the United States, venture capital has been shown to benefit start-ups beyond the supply of finance, with a soft side that adds to the hard financial side (Hellmann 2000). In Europe, it is not clear which of these two sides is more important. Our analysis seeks to shed some light on this issue.

### 1.3 Issues

We turn to analyzing in more depth the facts we have uncovered, exploiting a unique hand-collected data set, described in Bottazzi and Da Rin (2002a), that looks at the companies that listed on the new

markets between 1997 and 2001 and at their sources of finance. Venture funding is important among them: nearly 60 percent of these companies are backed by at least one venture capitalist.

By looking only at listed companies, we pay the price of ignoring the behavior of those that remain private, but believe this to be a reasonable price to pay. Since IPOs are the most lucrative exit from a venture investment (Brau, Francis, and Kohers 2002, Gompers and Lerner 1999), it is in venture capitalists' interest to take portfolio companies public whenever possible. Moreover, reputational concerns should ensure that only truly promising firms are brought public. Therefore, by looking only at listed companies, we expect we might overestimate the impact of venture capital on corporate growth. Focusing on listed companies also has its advantages: these companies belong to a small number of high-tech industries, are of fairly similar age, and come from a small number of countries.<sup>1</sup> They also provide a reliable control sample, allowing us to compare the performance of venture-backed and non-venture-backed companies.

### *1.3.1 Europe's New Stock Markets*

We base our analysis on information from the listing prospectuses and annual reports of 538 nonfinancial companies that listed on the Nouveau Marché, Neuer Markt, and Nuovo Mercato between March 1996 and December 2001. Our sample contains 538 of the 545 IPO prospectuses of nonfinancial companies and 1,183 post-IPO annual reports out of about 1,300 through fiscal 2001. We also obtained 755 pre-IPO balance sheets from listing prospectuses. Our data set extends to fiscal year 2001; the data are described in detail in Bottazzi and Da Rin (2002a).

#### **1.3.1.1 Listed Companies: An IPO Snapshot**

Table 1.4 provides valuable insights into the types of company that go public on these markets. First, these companies are small by all counts. The median values of assets and sales at IPO are 13.6 and 12.9 million euros, respectively, and employment equals 112.<sup>2</sup> The median age at IPO is just over eight years.<sup>3</sup> Listing companies are heavily leveraged—even more than those listing on NASDAQ. Their profitability, measured by return over assets (ROA), is fairly high; it is also very noisy, probably due to earnings manipulation and in line with most studies on IPOs (Degeorge and Zeckhauser 1993). From prospectus

**Table 1.4**  
Listing companies at IPO

	Mean	Median	SD	Number of observations
<i>Variables</i>				
Sales	44.9	12.9	173.0	536
Assets	41.7	13.6	183.0	538
Intangible assets	6.5	0.7	30.2	468
Debt	18.9	6.7	40.4	538
Equity	14.0	4.5	29.3	511
Leverage	0.56	0.58	0.27	508
Capital expenditure	-39.7	1.1	990.0	428
Return on assets	-57%	9%	5,149%	536
Age (years)	10.1	8.2	11	534
Employees	218	112	315	526
Share of foreign sales	39%	29%	32%	153
R&D intensity	35%	9%	119%	189
R&D labor share	28%	25%	18%	132
Capital raised at IPO	5,280	51.8	13,100	528
Free float	31.3%	29.3%	11.4%	528
<i>Variables growth rate</i>				
Sales	17,719%	27%	355,789%	497
Assets	1,612%	34%	21,412%	504
Debt	546%	20%	6,490%	501
Employees	101%	40%	468%	444

*Note:* Financial data in millions of euros. Debt is the sum of book value of short- and long-term liabilities. Equity is total shareholders' equity. Leverage is debt over debt plus equity. Capital expenditure equals investment in property, plant, and equipment. Return on assets is operating margin over assets, and operating margin equals earnings before interest, taxes, depreciation, and amortization. Age is measured from the time of a company's creation, not from its incorporation. Foreign sales share equals sales outside the company's home country over total sales. R&D intensity equals R&D expenditure over sales. R&D labor share is employees in R&D over total employment. Capital raised at IPO is the product of the issue price times the number of shares sold from the capital increase (excluding the greenshoe). Free float is the percentage of shares floated on the market.

information, we can construct the growth rate of sales, assets, and employees in the two years before the IPO. These are all remarkably high—between 27 and 40 percent. The growth rate of debt is also remarkably high. If we consider that the growth rate of bank loans is close to zero, it appears that these companies may have come close to using up their borrowing capacity and face binding credit constraints.<sup>4</sup>

Since these markets were designed to appeal to innovative companies, we look at how they invest in research and development (R&D). At 9 percent, R&D intensity, defined as R&D expenditure divided by sales, is close to the typical value for high-tech companies in other countries, though it is reported by only a third of the companies. A similar result comes from the consideration of the share of employees working in R&D. About a quarter of the companies report R&D labor figures, and this is fairly large: 25 percent of total employment. Apparently puzzling is the low share of intangible assets, which include patents, software, and goodwill. For innovative firms, intangible assets may represent a large part of total assets, yet in our sample, intangible assets are only about 5 percent of total assets. One possible explanation is that U.S.-based accounting standards, adopted by many firms in our sample, do not allow for most of the intangible expenses to be capitalized.

### 1.3.1.2 Life after the IPO

What role does going public have for these companies? The figures shown for all firms in Table 1.5 provide a clear answer: a very important role. The first row of each variable in the table reports the average median values in the two years before and in the two years after the IPO for several variables.<sup>5</sup> On these values, we perform a Wilcoxon sign-rank test. The bold type identifies variables whose values differ in a statistically significant way (i.e., at the 5% confidence level). In about two years, the value of sales more than doubles, reaching 28.3 million euros. Employment, which in Europe represents a long-term investment, more than triples, and capital expenditure increases twelve-fold. Listing also entails halving leverage, but also increasing debt dramatically. These companies then go public to raise capital, invest, and grow, consistently with the relaxation of credit constraints via the IPO. It is also worth noticing that companies active in R&D keep their quest for innovation high: R&D intensity and R&D labor share do not fall despite the surge in sales and employment.

**Table 1.5**  
Post-IPO growth

		Pre-IPO	Post-IPO	Number of observations
Sales	All firms	12.2	28.3	398
	No VC	<u>13.2</u>	<u>33.5</u>	212
	VC	<u>9.8</u>	<u>21.9</u>	187
Assets	All firms	11.9	50.9	390
	No VC	14.3	<u>55.3</u>	205
	VC	10.7	<u>45.5</u>	185
Intangible assets	All firms	0.2	6.0	263
	No VC	0.2	<u>7.7</u>	151
	VC	0.2	<u>3.6</u>	112
Debt	All firms	4.0	14.5	359
	No VC	4.3	<u>16.6</u>	191
	VC	3.8	<u>11.4</u>	168
Equity	All firms	1.9	34.3	324
	No VC	<u>1.7</u>	34.9	173
	VC	<u>1.4</u>	28.1	151
Leverage	All firms	0.74	0.31	319
	No VC	0.74	0.33	170
	VC	0.76	0.31	149
Capital expenditure	All firms	0.5	6.4	260
	No VC	0.7	<u>6.8</u>	144
	VC	0.5	<u>4.8</u>	116
Return on assets (ROA)	All firms	8%	4%	353
	No VC	<u>0.13</u>	<u>0.05</u>	188
	VC	<u>0.05</u>	<u>0.02</u>	165
Employees	All firms	72	213	313
	No VC	<u>85</u>	210	201
	VC	<u>62</u>	175	112
R&D intensity	All firms	12%	11%	96
	No VC	<u>0.07</u>	0.09	53
	VC	<u>0.13</u>	0.11	43

*Note:* For each variable, we report the average value of the medians for the whole sample (first row), for non-venture-backed companies (second row), and for venture-backed companies (third row). Bold values indicate statistically significant (at 5 percent confidence level) differences across time. Underlined values indicate statistically significant (at 5 percent confidence level) differences between venture-backed and non-venture-backed companies. Financial data in millions of euros. Debt is the sum of book value of short- and long-term liabilities. Equity is total shareholders' equity. Leverage is debt over debt plus equity. Capital expenditure equals investment in property, plant, and equipment. Return on assets is operating margin over assets, and operating margin equals earnings before interest, taxes, depreciation, and amortization. R&D intensity equals R&D expenditure over sales.

### *1.3.2 The Effects of Venture Capital on European Entrepreneurial Companies*

We now turn to the core of our analysis and look at two sets of issues. First, does venture backing make any difference in terms of corporate growth? Second, since the new markets have come under intense criticism for their dismal stock price performance, have they succeeded in attracting and selecting companies with a true high-growth potential?

We start by noticing that existing studies have largely been conducted for industry associations using methodologies that do not meet rigorous academic standards. According to these studies, venture-backed firms are found to grow faster, create more jobs, and export more than samples of established firms.<sup>6</sup> By comparing venture-backed firms with large firms, which are by their nature less dynamic, these studies fail to use a proper control sample. A correct comparison should instead pit venture-backed against non-venture-backed start-ups. These studies therefore are unable to separate the effects of venture capital financing from those of being a (naturally fast-growing) start-up and risk capturing effects due to a spurious correlation between being a start-up and receiving venture capital. In other words, it could very well be that the purported vitality of European venture-backed firms is due to factors other than venture capital. A deeper analysis is therefore warranted.

#### **1.3.2.1 Venture Capital and Corporate Growth**

Our first piece of evidence comes from a systematic comparison of how venture-backed and non-venture-backed companies behave around the IPO. We take the IPO as a turning point in the life of these companies, because it provides them with the financial resources necessary to unfold their business potential fully. The corresponding figures are shown in the second and third rows of each variable in Table 1.5, which reports the results of two tests. A Wilcoxon sign-rank test looks at the difference in the two-year average of median values pre- and post-IPO, distinguishing between non-venture-backed (second row) and venture-backed companies (third row). Within each category, bold figures show the values that differ significantly across time. A Kruskal-Wallis sign-rank test then looks at whether, for each variable, the averages of median values differ between venture-backed and non-venture-backed companies in both the pre- and the post-IPO

periods. Underlined figures show which values differ in a statistically significant manner.

Extending our data set to fiscal year 2001 confirms the picture offered in Bottazzi and Da Rin (2002a). Before the IPO, venture-backed companies are somewhat smaller in terms of sales and employment. They are also less profitable. After the IPO, non-venture-backed capital companies become significantly bigger in terms of sales, debt, and capital expenditure and remain more profitable. Although these results are suggestive, they cannot be considered conclusive. We thus turn to regression analysis. We have in mind a very simple model of corporate growth (see Hart 2000): the ability of a firm to grow is a positive function of its ability to invest, which can be financed from either revenues or external finance. We control for ownership structure as in Bottazzi and Da Rin (2002b). A large theoretical literature predicts that ownership should influence corporate performance, in particular for young, entrepreneurial firms (see Shleifer and Vishny 1999). Ownership structure has in fact been found to be an important determinant of post-IPO corporate performance of U.S. firms by Barry et al. (1990) and Mikkelsen, Partch, and Shah (1997).

**Employment** We report our regression in the second column of Table 1.6.<sup>7</sup> The dependent variable is the average growth rate of employment in the two years after the IPO. We find that relatively younger companies and those whose leverage is lower increase their employment more. Leverage, in particular, is not only statistically but also economically significant: a 10 percent increase in leverage means a company decreases its growth rate of 0.42 percent in the post-IPO period. Companies listed on the Neuer Markt experience an employment growth rate 31 percent higher than the others. As expected, ownership matters.<sup>8</sup> The continued presence of founders who retain a majority of votes has a positive effect on growth, supporting views of substantial agency problems within entrepreneurial firms. Most notably, we find that venture capital plays no role: it implies a decrease in the employment growth rate, which is, however, statistically insignificant. Sectors of activity and year dummies are not found to be statistically significant.

**Sales** In the third column of Table 1.6, we turn to the post-IPO sales growth rate. Our dependent variable is now the average growth rate of sales in the two years after the IPO. The results do not differ much from those for employment growth. Older and more leveraged

**Table 1.6**  
Robust regression—post-IPO corporate growth

Dependent variable	Employment growth rate	Sales growth rate
Independent variables	Coefficient (t-statistics)	
Venture capital	-.0021 (-.03)	.1269 (.93)
Leverage (at IPO)	-.0408*** (-2.76)	-.1012*** (-3.74)
Age	-.0008* (-1.88)	-.0011** (-2.52)
Dummy 1999	-.0005 (-1.49)	.1562 (1.10)
Dummy 2000	-.0001** (-2.20)	.1127 (0.7)
Capital raised at IPO	.0002 (0.92)	.0018*** (3.98)
Founders	.2331*** (3.37)	.2375 (1.90)
Management	.0546 (0.52)	.2749 (1.44)
Neuer Markt	.2867*** (4.01)	.4179*** (3.16)
Constant	.1612 (1.08)	.7125** (2.47)
Number of observations	357	385
F (14, 342)	3.59	5.01
p-value	0.0000	0.0000

*Note:* All independent variables measured at the time of the IPO. Significance levels are indicated by \*(10 percent), \*\*(5 percent), and \*\*\*(1 percent). Huber-White corrected standard errors are used to obtain robust estimates.

companies experience a lower sales growth rate: a 10 percent increase in leverage results in a 1 percent lower post-IPO sales growth rate. Companies listed on the Neuer Markt have almost 39 percent higher sales growth rate. Venture capital financing remains ineffective: venture-backed companies sell 17 percent more than the others, but the result is not statistically significant. As in the case of employment, ownership has a positive effect, but this is no longer significant. What is significant instead is the impact of the amount raised at IPO (normalized by the total value of assets). Year dummies and sectors of activity continue to hold no effect apart from companies in the biomedical sector, which experience a slightly lower sales growth rate. These results are unchanged when we control for lagged sales growth rate and for firms' pre-IPO profitability.<sup>9</sup>

#### **1.3.2.2 Venture Capital and Capital Raised at IPO**

We now analyze whether venture capital affects the amount of capital raised at IPO, which provides the resources necessary for realizing a company's growth potential. We know that an important role of venture capital is the provision of financing. Does this also imply that venture-backed companies are able to raise more money from the public markets? There could be opposing effects of venture capital financing. On the one hand, "certification" from a venture capitalist may reassure investors and increase the amount of capital raised. The same would hold true if it were the case that venture capitalists are patient enough to wait for a hot IPO market, as found for the United States by Lerner (1994). On the other hand, if venture capital pushed firms to the market, its eagerness to exit quickly could be detrimental for the amount of funds raised.

Table 1.7 reports the results from our regression. The dependent variable is the amount of funds raised at IPO normalized by total assets. Notice that we use assets, not sales. The reason is that sales would be a poor measure of the size of these young, innovative companies, which need time to unfold their growth potential. In fact, we view sales as a good measure of the extent to which an innovative company has matured. Therefore, we use sales (divided by assets) as a regressor, along with controls for the ownership structure, leverage, and age, all measured at the time of the IPO. As in the previous regressions, we control for country and sectoral effects. Companies with higher sales (over assets, both measured at IPO), which therefore are probably more mature, are able to raise a higher amount at IPO: an

**Table 1.7**

Robust regression—dependent variable amount of funds raised at IPO

Independent variables	Coefficient (t-statistics)
Venture capital	.338* (1.80)
Telecom 1999	2.663*** (3.02)
France	-.4499** (-2.22)
Sales/assets	.1132*** (5.07)
Dummy 1999	.6542*** (2.29)
Dummy 2000	1.1108*** (3.95)
US-GAAP	.3783*** (1.99)
Founders	-.1132 (-.65)
Management	-.0675 (-0.26)
Leverage (at IPO)	.0110 (.25)
Age	-.0017*** (-2.81)
Constant	1.2703*** (2.62)
Number of observations	508
F (17, 492)	7.72
p-value	0.0000

Note: All independent variables measured at the time of the IPO. Significance levels are indicated by \*(10 percent), \*\*(5 percent), and \*\*\* (1 percent). Huber-White corrected standard errors are used to obtain robust estimates.

increase of 10 percent of sales (over assets) brings an additional 1 percent increase in the amount raised. Since the latter is normalized by assets, this is an economically sizable effect. Ownership structure becomes important, with venture capital having a positive and significant effect.

To control for the high stock market valuations in the period under consideration, we use year dummies. Firms that listed in 1999 and (especially) in 2000 turn out to have received significantly higher valuations. Therefore we control with the use of a dummy variable the high valuations that telecom companies experienced in 1999. We also introduce a dummy (US-GAAP) that takes the value one for all firms adopting U.S. Generally Accepted Accounting Principles in their issuing prospectus. This choice is motivated by the ongoing policy debate over the effectiveness of accounting standards. US-GAAP are widely accepted internationally and are therefore a way to increase the pool of potential investors (see Ashbaugh 2001, Levitt 1998). By controlling for the adoption of US-GAAP, we thus investigate whether firms exhibit measurable differences in proxies for information asymmetry and market liquidity, two constructs that are of primary concern in securities and accounting regulation (Leuz 2002, Leuz and Verrecchia 2000). We find the choice of accounting standards to be a primary determinant of the ability to raise capital at IPO. Firms adopting US-GAAP raise an amount of funds (normalized by assets) that is more than 50 percent higher than other firms.<sup>10</sup>

### 1.3.2.3 Robustness Checks

We end our econometric exercise by noting that our results could suffer from two possible selection biases, on both observable and unobservable variables. In the previous sections, we evaluated the impact of venture capital financing on the companies listed on the new markets. The evaluation problem, as it is known in the econometric literature, is the problem of correctly measuring the effect of a “cure,” such as a policy reform or a training program, on some variables (see Blundell and Costas Dias 2000). In Bottazzi and Da Rin (2002c), we describe in detail how this issue can be tackled and implement some robustness checks to this purpose. Overall, we conclude that the inference from our regression analysis may not be robust to possible specification biases with respect to observable variables in the case of employment growth rate. In the case of the amount of funds raised at IPO, instead, we find reason to remain confident on the robustness of our findings.

## 1.4 Research Agenda

We have documented profound changes in European entrepreneurial firms' ability to raise external finance from venture capital investors and from the stock markets. Our results suggest a rich research agenda for both empirical and theoretical economists.

### 1.4.1 *Are Venture Capitalists All Equal?*

In Bottazzi and Da Rin (2002a) we found no evidence of a positive role of venture capital on firms' growth, while in Bottazzi and Da Rin (2002b) we found that companies backed by corporate venture capitalists are faster in increasing their sales after going public, suggesting that industrial investors may be particularly useful in helping the commercialization of new products. These seemingly conflicting results call for deeper analysis that distinguish among the heterogeneous nature of the venture capitalists. Unfortunately, when talking about venture capital, we face a single standard model, which has emerged from the U.S. pattern, where venture firms are typically independent partnerships funded by pension funds and institutional investors (Gompers and Lerner 1999). However, in Europe, bank-affiliated and corporate venture capitalists are more common. A more precise understanding of what this means for the financing of entrepreneurial companies has yet to emerge and may greatly increase our understanding of the economics of venture capital and the effectiveness of policy measures. Some recent contributions show that this line of research is indeed promising. For instance, Mayer, Schoors, and Yafeh (2002) document the effect that different sources of finance have on the investment behavior of venture capitalists. They find a significant correlation, so that, for example, independent venture partnerships invest in earlier stages more often than do bank-owned venture firms. Similarly, Hellmann, Lindsey, and Puri (2003) find that U.S. bank-funded venture funds invest in firms that are more likely to become future borrowers. Also, corporate venturers are likely to behave differently. A difference in the behavior of bank-based venture firms is theorized by Ueda (2002). Hellmann (2002) provides a theoretical rationale for a different behavior of corporate venturing, based on the idea that corporations (unlike independent investors) take into account the risk of product cannibalization by new ventures.

Whether organizational form and investor type matter in influencing investment decisions is still a largely unexplored question, whose

answers are likely to bring new advances in our understanding of the investment process. Also promising is the exploration of the value-adding activities of venture capitalists. Kaplan and Strömberg (2002), for instance, look into the details of advising and monitoring activities, linking them to the use of different contractual instruments and to different characteristics of portfolio firms.

While the sources of funds may determine different goals and investment patterns, the identity of venture capitalists themselves should also play a role. More precisely, the core of venture investing consists of many decisions that are technical in nature, from the screening of business plans, to the monitoring of entrepreneurs, the dispensing of advice and support, and the decision to terminate, sell, or bring public a business. One would then expect human capital to matter almost as much as financial capital, and thus to find that different educational backgrounds and work experiences result in different investment choices. Surprisingly, this aspect of venture capital has been neglected so far. A recent contribution of Bottazzi, Da Rin, and Hellmann (2004), the first systematic study of this issue, finds that professional experience does matter. Moreover, these authors show the importance of the interaction between human capital and investor type, as independent, bank, and corporate venture capital firms tend to attract different breeds of venture capitalists.

Breaking up the differences in nature of venture capital and their meaning for investment choices is probably the most promising research opportunity. The many facets of the interplay between organizational form, investor type, and partners' human capital is therefore a promising turf for new research, and is likely to yield messages relevant for public policy issues. For instance, is it justified to rely on bank-based venture capitalists to develop national capital industries in countries where banks dominate financial markets? Also, should we encourage the accumulation of human capital by venture partners? And what about the importance of vintage itself in the maturation of venture firms? Answers to these questions are likely to greatly improve the efficacy of any public policy measure.

#### *1.4.2 Heterogeneity in Institutional Environments as the Source of Cross-Country Differences*

Financial intermediation takes up very different forms in different economies. There is ample evidence, for example, that banks behave

differently in the United States, Europe, and Japan. A variety of models rationalize these differences and show that factors like regulations, the size and openness of the economy, the development of equity markets, and product market structure create institutional constraints that shape the demand and supply of credit and result in very different financial structures across economies. The recent development of institutional comparative economics (see Aoki 2001 and Djankov et al. 2003 for surveys) provides a new and insightful perspective on why financial contracting may differ across countries and therefore why we should expect the goals, styles, and decisions of venture capital firms to differ across both organizational types and borders. The fact that venture capital has been so successful in the United States, where it developed, may justify the initial focus of scholars on that paradigm. But there are clear limits to remaining oblivious of the variety of legal and institutional constraints that affect venture firms in different contexts. Some promising work has already begun here. From a theoretical perspective, Inderst and Müller (2003), for instance, show the importance of market structure for the behavior of venture firms. This is very important for public policy, as they show that when the supply of funds is particularly strong, the incentives to monitor and support portfolio firms may weaken.

Another dimension that clearly differs widely across countries is contracting, as reported by Cummings (2002) and Kaplan, Martel, and Strömberg (2002), among others. These studies (still preliminary) find that contracting in Europe differs from the U.S. paradigm documented by Kaplan and Strömberg (2002). Laporta et al. (2000) raise the question of whether different contractual forms respond only to legal constraints or if they also represent different solutions to the underlying governance problem of financing and supporting entrepreneurial startups. Comparative empirical studies starting with Sapienza, Manigart, and Vermeir (1996) and more recently with Cummings and Schindele (2003) provide some hints, but a clear answer is still to come. Looking at the end of the venture capital cycle, Schwienbacher (2002) finds that exit behavior is significantly different in the two economies. For instance, syndication is significantly more common in the United States, where the duration of venture investments is shorter. Interestingly, exit strategies seem to differ more (across the two economies) for older venture firms, while venture firms founded after 1997 tend to converge toward similar behavior.

We also note that a pressing issue to solve is the need for more systematic evidence on the behavior of venture capital firms in European countries. This should be a high priority for researchers, but also a task to be encouraged, favored, and supported by the European Venture Capital Association, whose contribution to data collection has been mainly at the aggregate level. New data, for example, could help us understand what the contribution of venture capital is to the financing of European entrepreneurial firms. The question is still open, but if the existing evidence in favor of a minor effect of venture financing on corporate growth were to be confirmed, we should look for roles other than growth support. A likely candidate is the provision of funds at early stages, so as to allow new ventures to overcome financing constraints.<sup>11</sup> A recent study by the European Venture Capital Association (2002a) argues that entrepreneurial companies look at venture capital as a primary source of financial survival precisely because they cannot find alternative sources of credit. Microeconomic studies of the effects of venture capital on the capital structure and borrowing capacity of portfolio firms could put these claims on firmer grounds.

### *1.4.3 Barriers to Entrepreneurship*

Finally, barriers to entrepreneurship may have a large impact on the way in which venture capital operates in Europe. It is often argued that labor and financial market rigidities discourage entrepreneurial activities and that bankruptcy rules excessively penalize failed ventures. How do these factors affect the creation of entrepreneurial, innovative, high-growth companies? Some recent theoretical contributions help explain the channels through which these factors work. Landier (2001) suggests that bank financing and bank-controlled venture firms may be prevalent in Europe because of the high stigma associated with bankruptcy, measured in terms of cost of credit for failed entrepreneurs. He argues that a high (low) stigma for failed entrepreneurs—typical of Europe (the United States)—is associated with few (many) start-ups and the adoption of less risky (riskier) projects. Debt-like (equity-like) contracts, common in Europe (the United States), provide the optimal contract in this situation. His normative prediction is that a more forgiving bankruptcy regime might spur venture capital and, in turn, entrepreneurial activity. In another recent contribution, Gromb and Scharfstein (2002) focus on labor market rigidities as a barrier to entrepreneurship. They maintain that when failing means a lower wage for the entrepreneurs, financing a project within a firm (intrapre-

neurship) becomes more attractive than venture capital, thus thwarting the creation of new ventures. Labor market structure thus determines the prevalence of different forms of financing start-ups. A major message of this line of research is that the interplay between credit and labor markets should be better understood and explicitly taken into account by policy makers.

A related dimension is that of intellectual property rights, another important policy instrument. Patent policy, in particular, has traditionally been framed within industrial organization concepts, balancing incentives for innovators and the desirability of competitive markets. But other possible approaches may better identify how entrepreneurship is affected by property rights. Hellmann (2002), for instance provides an explanation of intrapreneurship (the creation of new businesses within existing companies), which highlights the importance of intellectual property rights over employee-generated inventions, and Ueda (2002) shows how poor protection of intellectual property rights may hamper the growth of the venture capital industry.

More generally, we are far from a satisfactory understanding of the mechanics of the entrepreneurial process, and some new contributions are starting to look into the details of the process (see Perotti and Biais 2003 for one such effort). As new conceptualizations of entrepreneurship are taking place, the role of financing by venture capital (but also the more informal angel investors, which are of great importance when a new business is conceived) is becoming clearer. Moreover, the magnitude of the effects across different markets and institutions has yet to be tested against hard evidence, and work based on data from countries with different structures could provide very useful new insights. There is a large gain to be made by a rigorous empirical exploration based on these theories and a chance to increase our understanding of the working of venture financing in Europe substantially. The institutional and regulatory diversity of European countries is in this case a blessing to researchers.

#### *1.4.4 Is There a Role for Stock Markets Targeted at Entrepreneurial Companies?*

We have documented profound changes in European entrepreneurial firms' ability to raise external finance from the stock markets. Companies listing on Europe's new stock markets undergo a dramatic change in their capital structure, invest the large proceedings of the IPO to expand investment in physical and intangible assets, and soon

experience increased growth rates of employment and sales. But we have also documented a substantial heterogeneity in performance: extremely successful firms coexist with weak ones. An open question is why this has happened. We have seen that a possible candidate is the quality of disclosure standards. To impose high disclosure standards has the effect of discouraging the listing of poor performing firms (Bottazzi and Da Rin 2002b). While much theoretical work has been done recently on the competition among exchanges in terms of listing rules, there is an obvious need to evaluate how different rules perform in terms of selecting valuable companies.

This is particularly important now that Europe's new stock markets have come under heavy criticism for their supposed inability to provide investors with attractive returns. The closure of Germany's Neuer Markt is in fact seen as proof that these markets have proven ill suited. We have a different opinion. One overlooked fact is that the Neuer Markt was built around the idea that rigorous disclosure standards are crucial for the listing of entrepreneurial companies. This idea resulted in the listing of some very successful companies that have raised the money they needed to invest and grow. The fact that some scandals have tarnished the Neuer Markt's reputation should not overshadow its positive results. In fact, it is telling that the stress on disclosure quality now forms the core of the Deutsche Börse Prime Standard, to which many companies from the Neuer Markt have migrated. In our view, this has been an overall successful experiment, and the excesses and difficulties it experienced were not so different from those encountered by NASDAQ in its early days.

Another important question is the extent to which venture capital and the stock market help each other. The view prevailing among practitioners is that exit by IPOs is a necessary condition for venture capital to thrive. Michelacci and Suarez (2002) formalize this view, which receives some preliminary support from Jeng and Wells (2000). In the European context, the opening of the new stock markets represents an interesting experiment in this respect. The fact that their opening coincided with the surge in venture capital fund-raising and investment creates a challenging research task: to disentangle the effective link between stock markets and venture capital from a variety of policy and institutional changes that took place during that period. In a different but related context, Hochberg (2002) finds that venture-backed firms exhibit better governance structures than other newly listed firms, suggesting that venture capital may contribute not only to

the number of listing companies but also to their appeal to investors. Learning whether these two sources of finance for entrepreneurial firms really complement each other can offer new insights to policy makers.

#### *1.4.5 Can Taxation and Subsidies Stimulate the Creation of Entrepreneurial Companies?*

Taxation and subsidies are the most traditional means of public intervention in any market, including the financing of entrepreneurial companies. New ventures give rise to many taxation possibilities, ranging from capital gains to wages and profits. The European Venture Capital Association (2002b) strongly argues for favorable taxation of venture investing, given the positive effects it has on economic growth. This claim received support from recent U.S. evidence (Cullen and Gordon 2002), although very little is available so far for Europe, which makes it hard to evaluate the merits of any reform proposal. Empirical research in this direction is therefore urgently needed. Also the theoretical understanding of the effects of taxation on venture creation is unsatisfactory. Taxation of capital gains, profits, or wages has so far been considered from the point of view of the incentives for investors and entrepreneurs to confer money and time to the creation of a new venture (Gompers and Lerner 1999). This traditional approach has focused on capital contributions and capital gains in isolation. However, we have seen that a distinct feature of venture capital is the provision of mentoring and advice. In an interesting recent contribution, Keuschnigg and Nielsen (2002) explore the interplay of different forms of taxation, the provision of mentoring services, and entrepreneurs' decisions to set up a venture. They suggest that a broader policy scope can have important advantages, since it takes into account the effect of taxation on the incentives to mentoring and how these in turn affect entrepreneurs' trade-offs between setting up a venture and remaining in a salaried job. Gilson and Schizer (2002) make another point worth considering. They claim that taxation is an important determinant of the preference for convertible securities in U.S.-style venture financing. Since the use of different securities affects the incentives of agents, and therefore the type of contracts that emerge in the market, we are reminded that taxation may have far-reaching (and unintended) consequences. This result should be taken into account by policymakers in Europe, where competing taxation and legal

structures may also have an impact on the location of venture financing and new firms.

A dimension mirroring that of taxation is that of subsidies. In the case of venture financing, these can take the form of outright investment by public funds, tax breaks for investors and companies, or coinvestment in private venture funds, which have been used in several countries. A rigorous evaluation of the effects of these support programs is still to be carried out. There are several possible channels through which public programs could benefit entrepreneurial firms. Lerner (1999), for instance, shows that the Small Business Innovation Research Program in the United States resulted in significantly higher growth of awardees and may have contributed to the growth and maturation of the U.S. venture capital industry. The presence of different venture capital public support programs in Europe offers a good opportunity to evaluate econometrically the effectiveness of different approaches. This appears to be a particularly urgent task, given the large efforts to spur the growth of the venture capital industry. Probably the most relevant issue here is whether public support would best be targeted at increasing the flow of funds into venture capital or at helping the maturation and professionalization of the industry. That the latter goal may be relevant is argued by Becker and Hellmann (this volume, chap. 2) and by Freeman (1998). The restructuring in 1999 of the European Investment Fund as a major investor in young and promising venture capital firms is a policy measure that seems to take into account these suggestions. A proper valuation of its impact on the European venture capital industry would be a stimulating and useful exercise.

### **1.5 Conclusion: What Role for Public Policy?**

In this study we document several barriers, institutional as well as structural, to the development of entrepreneurial firms. Our work suggests that public policies for the financing of entrepreneurial firms, which can take different dimensions, may be particularly important in creating a nexus of incentives and trade-offs conducive to entrepreneurial start-ups. We have identified several areas where recent economic analysis has shown that careful policy could potentially make a difference. It is thus encouraging to note that public policy seeks an active and fruitful role in this respect. The Lisbon Council in 2000, for instance, identified fostering technological innovation and entrepreneurship as crucial means toward the accomplishment of a more competitive Europe. This has resulted in a number of documents and

initiatives, ranging from the 2001 Report of the Wise Men on the regulation of securities markets to the recent Innovation Policy Communication (European Commission 2003). These documents reflect an active and ambitious EU-wide policy design, which several national governments are also trying to implement at the state level.

How can economic analysis help make policy making effective in this context? We argue that two approaches may be most fruitful. First, economic analysis can document and analyze facts and further elucidate the theoretical links between institutional constraints and identify practicable policy measures. This support is fundamental to developing informed policy measures. Second, economic analysis may contribute to policy design by questioning conventional wisdom. For example, Bottazzi, Da Rin, and Giavazzi (2001) argue that lower R&D productivity is behind Europe's dismal total factor productivity performance and make a conjecture that the former may be due to a short supply of high-quality entrepreneurial project rather than of venture funds. Obtaining convincing evidence of this link and of its extent could support effective policy measures. We hope our study will contribute to further policy-relevant research efforts.

## Notes

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1. Listing requires companies to disclose a large amount of information, which allows us to reconstruct their ownership, capital structure, and performance for up to three years before listing.
2. We concentrate on median values because of the high heterogeneity of most variables.
3. Companies listing on European main markets are usually older: Rydqvist and Högholm (1995) report a median age of twenty-six years for companies listing in the 1980s and early 1990s. Companies listing in the United States in the 1980s and 1990s are younger: they go public when they are six years old according to Ritter (1991) and five years according to Gompers (1996), who looks at a sample of venture-backed companies.
4. That this is a likely possibility is confirmed by the fact that in the year preceding the IPO, leverage falls by 2 percent.
5. These measures are the averages of the values of two pre-IPO and post-IPO years. If only one value is available, we use that one so as to make use of all available information.
6. For instance, between 1993 and 1997, British venture-backed companies increased employment by a yearly 24 percent, and sales by a yearly 40 percent. By comparison, employment at the 100 largest British listed companies grew by 7 percent, and sales by

15 percent (British Venture Capital Association 1999). On a European scale, between 1991 and 1995, employment at venture-backed companies grew by a yearly 15 percent and sales by a yearly 35 percent, as compared to 2 percent and 14 percent for the 500 largest European-listed firms (EVCA 1996). The National Venture Capital Association (NVCA, 1998) claims that U.S. venture-backed companies created jobs at a 55 percent faster pace than other start-ups between 1992 and 1996, and NVCA (2002) reached similar conclusions.

7. Given the variability in our data, we adopt a standard estimation method in all our regressions that eliminates gross outliers and employs robust standard errors. The method is based on Cook's *D* index, which identifies outliers and eliminates them.

8. We construct the following dummy variables: Founders takes value one if the company's founders retain a holding greater than 50 percent after the IPO, managers takes value one if the managers retain a holding of more than 20 percent, and venture capital takes value one if these investors retain a holding of more than 10 percent. These thresholds are the mean post-IPO values of the respective categories.

9. We also run our regressions eliminating half a dozen firms (all German) whose false accounting has since resulted in their delisting. Our results are robust to this check. The same happens if we drop ten observations of companies that received only bridge financing from their venture capitalists.

10. In all regressions we control for R&D expenditure in order to check whether venture capital has any effect in this subset of more active innovators (see Bottazzi and Da Rin 2002c for details). R&D performing firms have a 12 percent lower (and significantly so) growth rate of employment and a 14 percent lower (but statistically nonsignificant) sales growth than the others. The positive effect of US-GAAP is preserved. Again, venture capital does not seem to be relevant. The presence of a venture capitalist has a negative effect on jobs creation and sales as well as on the amount of capital raised by firms at IPO.

11. Bottazzi and Da Rin (2002b), for instance, look at the capital structure of companies listing on Europe's new stock markets. These companies are highly leveraged at the IPO and show signs of having used up bank credit. In fact, the proceedings of the IPO are used to rebalance the capital structure but also to substantially increase debt.

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