

THE DEVELOPMENT OF VENTURE CAPITAL IN EUROPE

THE ROLE OF PUBLIC POLICY

Emmanuelle Dubocage and Dorothee Rivaud-Danset

INTRODUCTION

The arrival of venture capital in Western Europe is generally dated to the beginning of the 1980s. However, the legal and tax incentives introduced during the 1980s were insufficient to ensure the development of venture capital, which only really took off during the second half of the 1990s. The recent development of this specific mode of financing innovation has been accompanied by intensified support from public authorities.

This study aims to analyze public policy support for venture capital. The first section situates the emergence of venture capital within its specific context, that of a new system of innovation within which small, innovative start-ups specialized in new technologies play a central role (boxes 1 and 2). The backwardness of Western European countries compared with the United States is due to the handicaps inherent in their national systems of innovation (NSI), which justifies the intervention of the public authorities. The second part compares venture capital activity in the U.K., which is particularly representative of the market-based financial system, and in Germany, which is representative of the bank-based system. It considers which financial structure is more favorable to venture capital, that is, whether the market-based system is superior to the bank-based system. The third part of the paper examines the details of French public policy to support venture capital. The French system is organized around a series of measures and public or semi-public institutions. The fourth section addresses issues of appraisal and recommendation: How can we assess French public policy to support venture capital? How should the government orient its policy support of venture capital? Are pension funds a necessary component of the financing of new technologies? The conclusion tackles the following question: To what extent is it desirable to

copy the American model

THE MOTIVES FOR PUBLIC POLICY SUPPORT OF VENTURE CAPITAL

The objective of French authorities is to stimulate the emergence of venture capital in order to favor the rapid expansion of new technologies in which new firms play a central role. Indeed, the emergence of venture capital is inextricably linked to that of innovative, new firms specialized in high technology, which we refer to as 'technology-based small firms' or TBSFs. The public authorities have become interested in this mode of financing through shareholders' equity precisely because it has proved to be the mode of financing preferred by TBSFs.

Whether we wish to analyze the conditions of the emergence of venture capital or to evaluate the public policy associated with it, we need to do so within a very broad context, one similar to the national system of innovation (NSI) context used to analyze the emergence of TBSFs themselves. The concept of NSI aims to explain the important trends in a region or country by focusing on both the regulations and the practices of the actors, or the institutions, involved. As the word "system" implies, this approach also underlines the importance of interactions among the key variables in explaining the characteristic elements of a country's technological dynamism, which is measured by the rhythm of technical change, the type of innovation (radical or incremental), sectoral specialization based on technological intensity, and the like. Typically, studies of innovation systems consider the core of such systems to be the organizations, such as universities, that are directly responsible for promoting science and technology together with the relations these organizations maintain with firms. The frontiers of innovation systems are wide in scope. They include the strategies of large firms, the incentives to create small firms, the education system, the characteristics of the labor market, not forgetting the financial system. To develop our understanding of what aspects of an innovation system are essential to support the emergence of TBSFs, we start by defining the characteristics of the "American model" in which venture capital plays an important role.

Analyses of innovation systems have led to quite convincing results concerning the decisive factors in the development of venture capital in the United States. Demand from

innovative firms “pulled” the development of venture capital more than supply from investors “pushed” it. According to Mowery (1992), the conditions of emergence of venture capital are inseparable from the American “innovation model”. The systemic characteristics of the American model endow firm-creation with particular significance in the process of commercial exploitation of technological opportunities. U.S. antitrust policy has led large firms to adopt a prudent policy of technological diversification, which leaves wide areas open for exploitation by individual entrepreneurs, who often come from within their ranks (corporate spin-offs). These small spin-off firms benefit from a benevolent attitude on the part of the large firms, notably in the field of intellectual property. Senker (1996), studying the biotechnology sector, pinpointed American university research as another source of spin-offs. Close links between universities and industry create a medium favorable to the incubation of high-technology projects. The two essential elements in the American innovation model are, therefore: 1) the links between research and industry and 2) the innovation strategies of large firms, which favor small independent firms on both financial and legal levels. In the United States, a new division of labor has emerged between existing firms and newcomers, marked by the outsourcing of innovative activity by large firms and by the appearance of firms specializing in the production of marketable innovations. This sharing of research between large, incumbent firms and small, recently created ones is one of the characteristics of the New Economy. It is particularly evident in the biotechnology sector (Sharp and Senker 1999). The American innovation model is also founded on other, more or less well-known, factors. The U.S. labor market encourages the mobility of scientific and technical staff, while venture capital can favor the formation of clusters (Cooke 2001). Finally, the public sector in the United States, through small business aid programs, plays its part in creating an environment conducive to the creation of high-technology.

Handicaps of the European System

The gap between venture capital activity in the United States and in Western Europe is substantial; Europe has only about one-fourth the amount of activity as the United States

(Dubocage 2001).¹ This difference is symptomatic of the difficulties encountered in most European countries in creating TBSFs and in leading them successfully through the first stages. The characteristics of the American innovation model cannot be found in Europe, where the innovation system is, on the contrary, hardly favorable to the emergence of new, purpose-built firms. The European model of innovation is based more on diffusion of new products than on their creation, and this is reflected in the poorer financial performance of European TBSFs. Germans have more limited expectations of returns to venture capital than Americans do, and since they do not expect extraordinarily high returns, they worry less about the exit issue than their American counterparts.

It is hard to know how much of the poor performance of venture capital in Europe to attribute to the quality of venture capitalists and how much to the quality of TBSFs. First, the European system does not encourage the collaboration of universities and industry or the spinning-off of new high-tech oriented firms from large corporations. According to Sachwald (2001, p. 32), the European innovation model is handicapped by the “incumbent syndrome”: “The American business ecology fosters learning through multiple experiments, which are carried away by TBSFs. The European business ecology on the contrary is relatively hostile to start-ups and much more favorable to incumbents”. In this context, certain large European firms pursue spin-offs more as a kind of social obligation than as an innovation strategy.

A second characteristic of the European model is the difficulty in exploiting scientific discoveries commercially. The gap between basic research and commercial application—the so-called “innovation gap”—is much more evident in Europe than in the United States, insofar as the links between public research and industry are looser. As a result of the innovation gap and the incumbent syndrome, start-up firms in Europe are subject to strong financial constraints, which are higher for firms specialized in new technology and lower for

1. “An analysis of the statistics for the venture industry reveals that compared with the USA, this is a very recent activity in Europe. In 1999, the ratio between the US and Europe for capital under management, venture capital raised, and venture investment is 4:1” (Dubocage 2001, p. 34). In 2000 and 2001, for relative investment flows, the ratios are respectively 3.5 : 1 and 2 : 1 for the seed and start-up phases and 4.5:1, 3.5 : 1 for investment in the development stage (Dubocage 2001).

subsidiaries of groups.²

Thus, up until the mid 1990s, Europe lacked the kind of demand from innovative projects with strong growth prospects that drove venture capital to a critical mass in the United States. In other words, European TBSFs were also hampered by a lack of equity financing, the so-called “equity gap” (Harding 2000). Europe also encountered a major obstacle on the capital supply side, which can be observed in every country. Uncertainty about the future results of a start-up is a major deterrent to the supply of venture capital financing to innovative high-tech firms anywhere. Venture capital firms promise investors high returns which means their portfolios must include only projects with exceptional return prospects. Selecting and monitoring TBSFs for the portfolio generates high costs which in turn brings down their rate of return to investors. Venture capital activity is therefore characterized by a double obstacle: high fixed costs relating to the selection and monitoring of firms combined with low economies of scale, on the one hand, and considerable economic risk concerning the viability and results of the firm, on the other. When the predicted return net of transaction costs does not compensate for the economic risk, a project is rejected. In Europe, the weak links between universities and start-up firms, which expressed the difficulties of applying basic discoveries, made the selection of projects riskier (i.e., increased the probability of choosing bad projects) and raised the related costs. This vicious circle played a part in rendering venture capital activity unattractive in Europe until the mid 1990s.

In France, up until the second half of the 1990s, while promoters of innovative projects complained of a lack of investors, investors were complaining that they could not find good projects to finance. The small-sized deals offered by investors were insufficient to meet the financing needs of the companies and to cover the transaction costs of the projects.³ Consequently, low, sometimes negative, returns rendered venture capital activity quite unattractive. The nature of the imbalance changed during the second half of the 1990s: following American practices, venture capitalists concentrated on larger projects that

2. European Community survey on innovation (CIS2) (Rivaud-Danset, 2002).

3. Interview with Pierre Battini, former president of AFIC (Association Francaise des Investisseurs en

promised rapid returns on investment. From this time on, it was projects of limited size that were most threatened by financial constraints.

These observations lead us to a more precise definition of the equity gap as it is seen in Europe. The rationing of demand principally affects long-term projects (such as often found in the biotechnology sector) whose results are more uncertain because of the length of time the investment is tied up and “small” investment projects seeking low volumes of capital, such as projects in the earliest stages of the innovation process. This is the reason why our paper focuses on the financing problems and solutions that affect the seed and start-up stages of innovative firms in particular.

During its emergent stages, venture capital activity is also handicapped by a lack of financial and technological expertise and this reinforces the discrepancy between supply and demand. Some of the skills of venture capitalists can only be acquired through learning-by-doing. As venture capitalists gain expertise the quality of selection improves and the costs of selection decline. In the United States, or more precisely in Silicon Valley, venture capital has emerged in a particular context, marked by intense relations between entrepreneurs and venture capitalists. This environment favored the acquisition-through practice-of the simultaneous expertise in engineering and finance that characterizes this activity, with the entrepreneurs becoming quite capable of fulfilling the functions of the venture capitalists and vice versa. The institutional mechanisms of venture capital developed within Silicon Valley nourished by successful investment in new firms and close relations between venture capitalists and entrepreneurs, lawyers, and investment banks. In Silicon Valley, unlike in other areas of venture capital concentration such as New York City or Chicago, venture capital evolved in close connection with the technological and entrepreneurial elements of the innovation system (Florida and Kenney 1988; Kenney 2000).

The favorable conditions in California supported the concurrent shrinking of the innovation gap and the equity gap. Hence, we can see that the institutional context affects the

Capital, see Glossary) and AFIC statistics.

strength of demand for venture capital financing from TBSFs and, possibly, the supply of equity capital to innovative start-up firms. The national innovation system in Europe was less favorable to the emergence of venture capital than the system in the United States and some other countries. This disadvantage provided the rationale for the public authorities in France and other continental European countries to take steps during the 1990s to modify the institutional context in order to make it more favorable to financing innovative, start-up firms. From this time, European countries adopted more interventionist approaches to support venture capital, not with the intention of subsidizing the incumbent firms or industries, but with the specific goal of supporting new actors and new practices in the supply of financing to innovative, high-tech start-up firms.

THE ROLE OF THE NATIONAL FINANCIAL SYSTEM

In order to evaluate what handicapped the emergence of venture capital in Europe we must examine how the national financial system may affect the development of this kind of financing. There is wide agreement, in both professional and academic worlds, that the market-based financial system is more conducive to the development of venture capital than the bank-based system. This agreement was reinforced when the rapid expansion of the “New Economy” at the end of the 1990s led many economists to believe that a new trajectory of long-term growth was opening up. To participate in this trajectory, they argued, a set of institutions capable of stimulating the required technical evolution would have to be adopted and these institutions would have to be constructed largely along the lines of the American model (see Amable 2001 for a synthesis). The argument that the Anglo-Saxon model facilitates the emergence of the New Economy and should therefore be wholly adopted by the public authorities is far from clear-cut, however.

After summarizing the main arguments of those economists who believe that certain financial characteristics favor innovation in new technologies, we compare the quantitative outcomes of venture capital activity in the UK, which is particularly representative of the market-based financial system, and in Germany, which is representative of the bank-based

system.

Is the Concept of a National Financial System Relevant?

The concept of a national financial system establishes a link, on two levels, between public policy to support venture capital and the desire to stimulate high-technology activities. On the macro level, since the work of Zysman (1983) and Cox (1986), the characteristic structure of a country's financial system has been acknowledged as a constraint on the orientation and effectiveness of public policy to promote national competitiveness. The adoption of public policies incompatible with the institutional financial framework may generate dysfunctions and result in failure. Second, on a more micro level, when the national financial system does not make adequate financial resources available to TBSFs, which typically lack equity capital and must depend on external funding, policy support for alternative financing may be necessary to promote innovative activity. Nevertheless, the application of the concept of a national financial system in the context of the New Economy raises several problems.

Globalization and National Systems

The first consideration is that the globalization-driven convergence of different financial systems may have made the idea of national characteristics irrelevant. Convergence comes from the global diffusion of venture capital practices developed in the United States and from international movements of capital. In Europe, in 2001, venture capital firms raised 52 percent of their capital in private equity markets outside of their country of origin (EVCA 2002).⁴ The pervasive importance of the business plan, of professional jargon, and of the contribution of capital organized by pools demonstrates the international spread of venture capital practices inspired by the American model. Observing the large volume of international capital flows in and out of smaller European countries, such as Ireland and Denmark, Bagyan and Freudenberg (2000) deduce that access to capital resources on an international level reduces the relative importance of national supply and consequently accentuates the effect on the development of TBSFs of factors from the demand side, such as entrepreneurial spirit.

4. Statistics on the geographical origin of capital raised are only available for private equity, not for

Nevertheless, globalization of capital markets and practices does not signify that the national dimension no longer plays any role. Venture capital activity is at the same time both international and local, and in many ways, it is sensitive to the local and national context. Investment in firms remains national insofar as frequent contact throughout the funding relationship requires venture capitalists and start-up managers to be geographically close. Thus, French organizations wishing to invest abroad (in the United States, in particular) create local subsidiaries or co-invest with national organizations to ensure proper monitoring of selected firms. In addition, largely for cultural reasons, the majority of new firms are listed on the specialized growth stock market in their country of origin, with the exception of the NASDAQ. Moreover, while capital may be internationally mobile, venture capitalists may not be, as the refusal of Italians from Silicon Valley to set up in Italy demonstrates.⁵ They require certain conditions, including transparency and knowledge of national regulations and information for select and monitoring projects. Thus, the continuing local nature of venture capital activity means that its institutional context, or in other words, the national financial system is still relevant.

National Financial Systems: An Ambiguous Reference

Nevertheless, reference to the concept of a national financial system raises a problem of another nature. A number of works that examine the relation between finance and innovation deduce the superiority of market-based financial systems over bank-based ones from an extremely generalized model that has the two types of national financial system in binary opposition⁶. This model is constructed from a small number of financial determinants that are assumed to exert a univalent influence on the non-financial sphere, including innovation activity (Table 1). According to the theoretical literature, the bank-based financial system is

venture capital.

5. Speech by F. Rampini, journalist for *La Repubblica*, during the Venture Capital and Local Development colloquium, 19 June 2002, *Caisse des Dépôts et consignations*.

6. G. Dosi and Orsenigo, 1988, "Structure industrielle et évolution technologique" in A. Heertje (edited for the EIB), *Innovation, Technologie et Finance*, Oxford: Basic Blackwell, pp. 13-33; G. Dosi, 1990, "Finance, Innovation and Industrial Change", *Journal of Economic Behavior and Organization*, 13, pp. 299-319; M. Aoki and G. Dosi, 1992, "Corporate Organization, Finance and Innovation" in V. Zamagni (ed.), *Finance and the Enterprise*, London: Academic Press; and J. Chritensen, 1999, *Financing*

unfavorable to radical innovation for the trivial reason that the contractual nature of bank debt and the importance of guarantees provided by collateral make bankers prefer to invest in low-risk projects and to avoid high-risk projects of radical innovation. Debt return cannot be high even if the risk of failure is high, hence equity capital is the appropriate means of funding. At the same time, the market-based system is seen as more favorable to radical innovation because the portfolio principle should open up the possibility of investing in radical innovation projects and the capital market should exercise effective control over the corporate management.

Recent theoretical literature analyzing the relationship between the institutional structures in different countries and the types of activity that developed there has refined this dichotomy. Mayer (2001) proposes a synthesis of this literature, distinguishing between three categories of theories about this relationship: theories of information, of commitment, and of control. According to the information theories (Allen 1993), new technology firms can take advantage of the financial market, where investors' forecasts—unlike bankers'—are subject to review. Banks favor investment in more traditional industries where they have an informational cost advantage. According to the commitment theory, (Franks and Mayer 1995 and Carlin and Mayer 2000), the concentration of corporate ownership that is so widely observed in continental Europe favors activities that involve long-term investment, whereas widely-held ownership encourages short-term investments, which require more flexibility and less involvement on the part of investors. The theories of control (Dewatripont and Maskin 1995) argue that fragmented banking systems are associated with short-term investments and concentrated banking systems with long-term investments. Widely-held bank ownership is compatible with high-risk investments in research and development, while concentrated ownership is suited to lower-risk investment in less innovative projects.

Such dichotomous analyses are not directly relevant to venture capital financing of TBSFs because they attempt to explain some important characteristics of financing large

firms. More generally, they provide an ambiguous basis for empirical study. On the positive side, they invite us to relate institutional structures (the organized actors and their game rules) to the riskiness of the innovation and high-technology activities they engage in. On the negative side, however, these models lead empirical analyses to describe actual national systems in terms of only a small number of financial variables (benchmarks). In particular, this reasoning leads investigators to ignore such factors in the relationship between financing and types of innovation activity as links between universities and industries, strategies of the large incumbents, characteristics of the labor market, and capabilities of entrepreneurs and financial actors. Hence, we should not be surprised if analyses framed in terms of the opposition of bank-based and market-based systems have limited capability to explain the growth of new technologies in general or the emergence of innovative firms in any particular country, because this approach overvalues the explanatory power of the financial structure while neglecting key aspects of a national system of innovation.

Table 2 follows this national financial system benchmarking approach to compare the United States, the U.K., and Continental Europe (Germany and France) according to the financial market characteristics that define the development of venture capital. It also benchmarks them in terms of two qualitative variables that characterize national systems of innovation. As the table shows, the characteristics of the financial and innovation systems in the United States are all highly favorable to the development of venture capital. The financial characteristics of the U.K., also all favorable to venture capital, are slightly less positive than those of the United States, but overall they are clearly more favorable than the characteristics of the Continental European countries. Thus, qualitative benchmarks do suggest that market-based systems, which exist in both the United States and the U.K., are superior to bank-based ones, as found in France and Germany. But this view does not hold up when we compare the quantitative outcomes of venture capital activity in a market-based system (the U.K.) and a bank-based system (Germany).

Financial Systems and Venture Capital Outcomes in the U.K. and Germany

Comparing the outcomes in the U.K. and Germany demonstrates the limits of explaining the level of venture capital activity in terms of the national financial system. It also provides additional arguments concerning the relation between government support of venture capital and the national financial system.

The British Paradox

The British market-based financial system is most similar to that of the United States, the country of reference for venture capital activity, and, as we saw, the institutional and regulatory framework of the U.K. appears *a priori*, to be more favorable to the development of venture capital than the framework in Germany. In terms of actual levels of venture capital activity, however, the U.K. mainly ranks behind Germany in early-stage investment. From 1998 to 2001 the U.K. far surpassed Germany in venture capital investment in the expansion stage, both in amount of funds and in share of GDP (Table 3). But with respect to the upstream seed and start-up stages, German venture capital investment exceeded that in the U.K., in terms of number of projects, amount invested, and, usually, percentage of GDP.

Additional data on the nature of venture capital activity in the two countries confirms that the theoretical advantages of the British system in financing new, high-risk firms do not materialize in practice. From 1999 to 2001, Germany surpassed the U.K. in both the proportion of venture capital investments going to the high-tech sector and the proportion of upstream investments (Table 4). In other words, compared with Germany, British venture capital is less oriented towards the more innovative, higher risk segments. The lower proportion of write-offs in the U.K. than in Germany could be interpreted as yet another indication of the orientation of British venture capitalists toward less risky segments. In a quantitative comparison between the U.K. and the United States, Lockett, Murray and Wright (2002) found that the U.K. ranks well behind the United States in the level of venture capital activity. They conclude: "Given the similarity of the US and the U.K. as the two most dominant examples of "Anglo-Saxon capitalism" (La Porta. et al. 1997), this divergence in their respective models of venture capital activity is perhaps surprising".

Several recent empirical studies (Harding 2000; Lockett, Murray, and Wright 2002; for a survey, Bank of England 2001) have examined the U.K.'s lack of dynamism in high-tech oriented venture capital investment during the 1990s and the funding difficulties suffered by British high-tech firms. The most convincing explanations for the British paradox are found in three counterintuitive interpretations of the institutional framework in the U.K. The first links the slower development of venture capital in the U.K. to the focus of British equity investment organizations, including venture capital companies, on take-over or buyout operations (Table 4). Development of venture capital suffered in the U.K. compared to Germany or France because the intensity of international financial activity in the City of London and the specialized financial engineering in the capital market led U.K. venture capitalists to overly concentrate on developing financial expertise and to neglect simultaneously developing technological expertise. The venture capital profession became a victim of its initial strength (Dubocage, 2001). The venture capital expertise of U.K. professionals also suffers because the gulf between the worlds of finance and engineering in the educational system is much wider in the U.K. than it is in continental Europe. A second explanation for the British paradox involves the fact that pension funds are the main contributors of investment capital (Table 4). This should, *a priori*, favor the development of venture capital in the U.K., but the argument is that dependence on this source of funding encouraged fund managers to focus on low-risk portfolios, putting an additional brake on the development of venture capital (Dubocage 2001). (The role of pension funds in supplying venture capital is examined in more detail in a later section.) Third, even the similarity between the U.K.'s institutional framework and the U.S. system, under which venture capital flourished, may have hindered the development of venture capital in the U.K. compared to other countries. With its faith in market principles and the suitability of the financial system to support innovation, the U.K. government did not see a need to undertake any coherent policy to support the financing of high-tech, start-up firms during the 1990s.

Germany, A Handicap Overcome

In contrast to the U.K., on qualitative measures, Germany's financial and institutional

framework do not appear particularly favorable to the development of venture capital activity, but on quantitative measures of venture capital activity, the country compares well with others (Tables 3 and 4). Thus, Germany's bank-based financial system seems not to have deterred the funding of high-risk start-up firms. Clearly, the financial institutions in place were not capable of financing SMEs with strong growth potential, but this very fact helped the government purposefully adopt policies to support such firms and thereby overcome the apparent handicap. The importance of government-sponsored guarantee and co-investment mechanisms is one of the main characteristics of German venture capital. Some mechanisms provide private capital with almost total risk cover, so that people refer to them as "venture capital without the venture". Public aid has proved to be a key element in the dynamism of venture capital activity in Germany, notably in the financing of the upstream stages of high-tech firms.

Even with government efforts to overcome its drawbacks, however, the bank-based financial model remains implicitly significant in the financing of new firms in Germany. Banks have changed from being direct investors to being indirect investors, as suppliers of capital to venture capital organizations. Moreover, the Hausbank continues to intermediate between venture capitalists and the two large public banks—the Kredit Anstalt für Wiederbau (KfW) and the Deutsche Ausgleichbank (DtA)—that are vectors of government support for venture capital in Germany.

The financial and institutional system in Germany could logically be expected to favor two different types of innovative activity. On one hand, the continuing importance of banks in the German financial system should tend to favor less radical innovation. This is the proposition of Casper and Kettler (1999), who distinguish between biotechnology firms oriented towards radical innovation, with high risks, and those oriented towards incremental innovation, with low risks. On the other hand, the scale of public guarantees accorded to venture capital organizations in Germany should tend to favor the highest risk innovations because the guarantees indemnify investors in case of failure while investors' potential capital gains in case of successful innovation are unlimited. Thus, we must look to other factors to

understand the type of innovative activity we observe in Germany. In particular, concern for employment security (i.e., lack of entrepreneurial spirit) seems to be the key factor in explaining the orientation of German TBSFs toward less radical innovation.

To sum up, our examination of venture capital activity in the U.K. and Germany showed, first, that there is not necessarily a simple link between the national financial system and a nation's specialization in activities of a certain technological level. With respect to new technologies, venture capital cannot be said to have performed generally better in the U.K. than in Germany. The presumed advantages of the U.K.'s market-based financial system for the development of venture capital activity oriented towards high-tech start-ups, and the presumed disadvantages of Germany's bank-based financial system are not reflected in actual ratios of venture capital investment flows at the seed and start-up stages. Second, no single factor is sufficient to explain the high growth of venture capital in Germany. The financial system, the public sector, and the conditions in the labor market all played a role. Moreover Germany's case illustrates how interventionist public policy can overcome the handicaps inherent in a national financial system.

PUBLIC POLICY TO SUPPORT VENTURE CAPITAL IN FRANCE

During the 1980s and the 1990s, most European countries adopted public policies aimed at encouraging development of the innovation process in order to remain internationally competitive in the specialized high-tech sectors. As in Germany, in France the policy to support venture capital is part of a wider program to support innovation and reduce comparative handicaps. For the last twenty years French authorities have constantly sought to maintain an active policy in this field, whatever the political coloring of the administration in power.

The legal, institutional, and tax framework to encourage venture capital activity that France put in place at the beginning of the 1980s is evidence of the authorities' long-standing

intention to favor the financing of new, innovative firms (Table 5).⁷ Venture capital mutual investment funds (Fonds Communs de Placement à Risque, FCPR) were introduced in 1983 and venture capital companies (Sociétés de Capital Risque SCR) were given legal standing in 1985; the SOFARIS was created in 1982, and the Second Marché, a capital market for SMEs, opened in 1983.

Despite this public framework supporting the financing of new, innovative firms, venture capital failed to emerge in France until the mid 1990s. Upstream venture capital investments collapsed from 1986 to 1995.⁸ In 1992 and 1993, in particular, in a generally unfavorable economic climate, many operators withdrew from this activity. Later on, venture capitalists became more selective and turned to less risky operations such as the financing of corporate development and buyouts.

Venture capital lethargy ended in 1996-97. The creation of the Nouveau Marché in 1996 had considerable cultural impact even though the new market listed only a small number of firms. The launch took place in a positive climate, due notably to an influx of capital that had been withdrawn from emerging economies. Both the volume and number of venture capital investments rose exponentially from 1998 to 2000 (Figures 1 and 2). This trend was reversed in 2000 with the bursting of the stock market bubble, and venture capital investment returned to its 1999 level by 2001.⁹

The eventual emergence of venture capital in France cannot be dissociated from the new policy approach toward venture capital and innovative firms that the authorities have pursued since 1996. At the end of the 1990s public authorities intensified their efforts by adopting a proactive policy in favor of venture capital (Battini 1999, p. 30). Since that time, France has

7. French public policy to support venture capital and to encourage innovative new firms included both global measures (such as the law on innovation) and targeted or specific measures (incubators, special seed funds) as well as permanent and temporary measures (public funds).

8. Upstream venture capital includes investments in the seed, start-up, and post start-up stages while downstream venture capital refers to investment in the development and expansion stages (see glossary).

9. The relative resistance of venture capital can be explained by the activity of the FCPI (infra), which attracted several hundred million euros of subscriptions over the last few years (the FCPI carries out one-third of investments). The biotechnology sector was the least affected by the crisis; it was the only sector in which total investment increased in real terms (<http://www.chaussonfinance.com>).

had a complete chain of innovation financing that extends from incubators and seed funds via venture capital organizations through to the capital market.

The characteristics of France's policy to support venture capital are:

- The policy is not to aid venture capital companies as such, but only insofar as they are best adapted for financing TBSFs. The intended target is start-up firms. The aim is to encourage the supply of financing in order to stimulate the demand for venture capital and, ultimately, to improve France's international competitiveness.
- The policy is presented as necessary, but also limited and temporary, in the same way that it may be necessary to aid an industry during its early days.
- The policy is reactive. It responds to needs identified in numerous reports on the shortcomings of the French system and the dysfunction of the venture capital market and institutes appropriate corrective measures (See, for example, Chabbal 1995 and Guillaume 1998).

The policy to support venture capital was adopted in conjunction with policies to promote innovative new firms and to encourage research-industry transfers. Between 1996 and 2001, the government implemented a whole range of measures to support the financing of TBSFs (Tables 6 and 7). Some of these measures are intended to encourage the creation of TBSFs, while others are intended to create an incentive framework for investors or entrepreneurs. Measures supporting the creation and development of TBSFs stimulate the demand side of the venture capital market while other measures benefit the supply side, that is, venture capital companies and their investors. In addition to introducing new measures, the government reinforced the programs of existing public and semi-public organizations.

Measures to Encourage the Creation of TBSFs

French authorities supported the creation of start-up firms by adopting a series of measures to facilitate research-industry transfers and, hence, to reduce the *innovation gap*. For instance, the Innovation and Research Act (1999) created an incentive framework for the transfer of technology between research and industry. One of the Act's main aims was to make it easier for researchers to start a company. Before its introduction, researchers and university staff, who were classed as civil servants in a public institution, did not have the right to create a company unless they left their research post. The new law allowed entrepreneurs to keep their status as civil servants.

In addition, in 1998 and 1999 the authorities launched technological research and innovation networks within the framework of the policy for technological transfer, which aims to promote closer links between public research and business.

Tax Incentives to Stimulate Venture Capital Supply and Demand

The tax measures aimed at the supply side of venture capital are intended to help close the equity gap by increasing the supply of equity capital financing to SMEs. The Finance Act of 1998 granted tax exemption for the investment income on life insurance policies with terms longer than eight years, of which at least 50 percent was invested in French shares, including 5 percent in securities not listed on traditional capital markets. These unlisted securities could be shares in venture capital mutual investment funds (FCPR) or mutual investment funds for innovation (FCPI), or shares in venture capital companies (SCR), in financial companies for innovation (SFI), or in firms listed on the Nouveau Marché. These so-called “DSK” contracts have not completely fulfilled expectations. The total value of investments attracted from individual savers falls well short of the amount expected when they were introduced.

Moreover, in 1998, the government created stock warrants for the creators of start-up firms in order to encourage a profusion of TBSFs, or, in other words, to boost the demand side of venture capital. Innovative new firms with strong growth potential have difficulty recruiting competent managers and executives when they cannot offer attractive rewards. To resolve this problem, the government created stock warrants for founders of TBSFs, entitling them to subscribe to a part of the equity at a price fixed at the time of allocation. The capital gain realized when the shares are sold is taxed at a preferential rate.

New Investment Vehicles to Encourage the Supply of Venture Capital

Mutual investment funds for innovation (Fonds Communs de Placement pour l’Innovation or FCPI) were introduced in 1997. Tax advantages are granted to individuals who invest in funds which allocate at least 60 percent of their assets in unlisted, innovative French firms. In addition, venture capital mutual investment funds with simplified procedure (Fonds Communs de Placement à Risque or FCPR) were introduced in 2000 to facilitate the setting up of new investment structures. The aim of this simplified procedure is to shorten the time

required to create an FCPR, by reducing the regulatory hurdles linked to approval by the COB (the French Stock Exchange Commission).

Public Institutional Support for Venture Capital

In addition to these specific policy measures, three public institutions have been important in promoting venture capital in France: the Caisse des Dépôts et Consignations (CDC), the Agence Nationale pour la Valorisation de la Recherche (ANVAR, National agency for the promotion of research), and the Banque de Développement pour les PME (BDPME, Development bank for SMEs). The CDC's main focus is to promote funding, but the other two are charged with supporting TBSFs and certain other responsibilities including support for innovative SMEs in the case of the ANVAR and support for SMEs in general in the case of the BDPME. The CDC and the ANVAR deserve particular attention.

The Caisse des Dépôts et Consignations: Catalyst for Funding

The CDC, a public investor whose domain covers both the non-profit and the competitive economies, plays a key role in the French venture capital world (Table 8). It intervenes through several different programs, particularly during the upstream stages of TBSFs, a crucial period in the dynamics of venture capital. The CDC helps to bring together public and private actors in order to improve the efficiency of funding mechanisms. The CDC is very active in the promotion of venture capital. It manages two capital funds, the public fund for venture capital (FPCR, Fonds public pour le capital risque) and the public fund for promotion of venture capital (Fonds de promotion 2000 pour le capital-risque) and one co-investment fund for TBSFs (Fonds de Co-investissement dans les jeunes entreprises, FCJE).

Created in May 1998, the objective of the FPCR is to increase the supply of venture capital for innovative TBSFs. It is also charged with promoting the entry of new financial operators into this sector, supporting new teams, and greatly increasing the number of specialist structures. The FPCR was granted €90 million by the government (from the proceeds of the France Télécom privatization) and €45 million by the European Investment Bank (EIB). This “fund of funds” can supply capital solely to the venture capital mutual

investment funds (FCPR). The latter must invest at least 50 percent of their assets in innovative French companies less than seven years old (box 3).

A second public fund, the Fonds de promotion 2000 pour le capital-risque, was set up in 2000, with initial resources of €150 million. The objective of this new fund is more precisely defined than that of the FPCR: to promote the creation of venture capital mutual investment funds that invest in sectors where private investment is less forthcoming, such as life sciences, electronics, and the environment, and/or to invest in venture capital funds run by new management teams.

The third public fund, the FCJE (co-investment fund for TBSFs), was set up in 2001. It has resources of €90 million provided jointly by the government, the European Investment Fund (EIF), and the CDC-PME, a subsidiary of the CDC aimed at financing small and medium-sized enterprises. The objective of the FCJE is to facilitate the second round of investment in TBSFs that have received an initial financing, so that they can avoid capital rationing. Through this fund, the CDC plays an informal role as a safety net when the economic climate is unfavorable to new businesses.

One of the tasks of the CDC-PME is to encourage seed funds. It participates in their creation and attracts other investors, both public (research organizations) and private (venture capital funds). The CDC-PME acts as a catalyst in this high-risk domain, which is reputed to be unprofitable. It operates at this critical stage in the funding and monitoring of TBSFs on a regional, national and even international level. Up to the year 2000, the CDC-PME supported seed funds that allocated a total of more than €800 million to 280 enterprises (<http://www.fpcr.fr>).

The CDC-PME supports regional venture capital activity by providing a “national grid” for the local provision of capital. The aim is to cover the whole territory of France instead of concentrating on one or more particular regions. Since 1994, the CDC has participated in the creation of 29 organizations, the majority of which are specialized in the funding of TBSFs. In December 2001, the CDC-PME was shareholder in 8 regional capital investment companies or funds representing assets of more than €1 billion, and it had invested €9.8 million in 24

regional capital investment organizations (<http://www.fpcr.fr>).

ANVAR: Focus on Innovation

Created in 1968, ANVAR is a public institution active in both industry and commerce and since 1979 its mission has been to provide financial assistance for innovation. ANVAR has an annual budget of approximately €200 million. It provides funding for innovative SMEs, laboratories, and creators of TBSFs. Its main financial tool is the zero-interest loan, repayable in the event of a successful business outcome. Since April 2001, ANVAR has been making direct contributions of equity capital to TBSFs (by means of stock warrants). It provides assistance in Nouveau Marché flotations and in connecting up innovative SMEs and venture capitalists. ANVAR is also responsible for approving the innovative character of firms eligible for investment from FCPIs. Lastly, it provides consultancy services.¹⁰ More generally, the expertise of ANVAR confers a certain status on entrepreneurs benefiting from its assistance and thereby generates leverage effects that we analyze in the following section .

THE DEVELOPMENT OF VENTURE CAPITAL IN FRANCE: RESULTS AND PERSPECTIVES

Despite the relative immaturity of venture capital activity in France we evaluate the effectiveness of past French policy from several perspectives. We then make some recommendations about the direction and continuing issues affecting policy support for venture capital in France. Finally, we evaluate the claim that, given the close association of pension funds with the rapid growth of venture capital in the United States, it is necessary for France to introduce these institutional investors in order to develop a dynamic venture capital sector.

Assessment of France's Policy to Support Venture Capital

We can evaluate France's policy of support for venture capital from the perspective of its design, its leverage effects, its comparative performance, and its effect on the financial system.

10. In 2001, ANVAR financed 1,341 R&D projects (feasibility and development stages) for the development of products, processes , or national services, with a total outlay of €180 million. It carried

Pragmatic Design

The policy to support venture capital that France adopted since the late 1990s is basically reactive and pragmatic; its underlying motivation is to help France catch up with the United States in innovative, high-tech activities. The approach of supporting venture capital rather than directly financing start-up firms has the advantage of channeling funds toward innovation without inhibiting the development of private expertise in selecting investment projects, monitoring firms, and leveraging financial assets (Dubocage and Rivaud-Danset 2002).

In implementing measures to support venture capital financing of TBSFs, French policymakers drew on best practices abroad. For example, they structured the FPCR along the lines of the Yozma in Israel (Avnimelch and Teubal 2002) and they used the US. NASDAQ as a model for the Nouveau Marché. Other European countries used similar measures, such as guarantee procedures and tax incentives, to support innovative SMEs, mainly because there are only a limited number ways available to provide outright financial support.

French policy also aimed to ensure that all stages in the financing of innovation linked up smoothly. The financing of innovative start-ups is similar to a hi-fi system—its overall quality is limited by the quality of the worst component. Individual measures can only be effective in promoting TBSFs if there are no weak or missing links in the chain running from initial seed funding through to divestment. The effectiveness of funding innovation depends on numerous factors, and public support is useless if, for example, venture capitalists lack the requisite expertise or if innovative activity is not driven by a supply of new projects. Authorities in France introduced measures that were designed specifically to strengthen the two weakest links in the chain: seed capital and divestment. Finally, French policy involves public intervention at various stages in the process of starting up a new business, but that intervention happens only when private initiative is lacking. The determination that public funding should not be a substitute for private capital is demonstrated by the fact that the

out 1,000 missions of aid in recruiting R&D engineers and researchers for SMEs (<http://www.anvar.fr>).

public 'fund of funds' (FPCR) is not a majority underwriter in the funds that it supports and it earns capital gains and bears losses like any other underwriter. Likewise, the CDC-PME is not a majority shareholder in the seed funds that it supports.

Leverage Effects

One aspect of the impact of public policy is the extent to which it stimulates private sector activity, or its leverage effect. Financial leverage is simply the ratio of private to public investment times the initial capital. When public policy stimulates private investment more by providing a quality signal than by funding, it is harder to quantify the leverage effect. Importantly, a public policy measure can also generate "organizational" leverage. For example, public support can create a new link in the funding chain by inducing private actors to participate in segments of activity that they would not enter on their own because of the inherent risks and costs. France's policy of public support for venture capital achieved various kinds of leverage, some readily measurable and some less measurable.

The public fund of funds, FPCR, is designed to create financial leverage: government money invested in private venture capital funds is intended to make it easier for them to attract additional investment. The leverage ratio for the FPCR was sizeable, reaching 7.5 in June 2002. The FCPR also generates less quantifiable organizational leverage by encouraging the emergence of new venture capital professionals.¹¹

Assistance from ANVAR generates leverage by signaling. It confers on a firm a mark of quality that guides and encourages private investors. In 1998 and 1999, 344 firms receiving innovation funding raised nearly €10 million from equity investment organizations that had signed agreements with the ANVAR.¹² Using the strictest definition, we calculate that

11. There is a discrepancy between the original objective of the FCPR (development of the venture capital profession by promoting and financially supporting new venture capital teams) and the actual outcome. In fact, half of the beneficiaries of this fund are existing teams. The bias in favour of established professionals can be explained by the importance of expertise acquired through experience: new teams have trouble gaining the trust of private investors because know-how is an implicit value in venture capital activity. The role of leverage for established teams is debatable. Public support does help these teams to reach international stature and acquire a reputation, but it is uncertain whether public capital is really necessary. Teams that have already proved their worth by financing successful start-ups are capable of attracting national and foreign private investors on their own.

12. The statistics used to calculate leverage are not available for 2000 and 2001.

recipient firms leveraged ANVAR's 1999 contribution by a modest factor of two.

The CDC PME generates organizational leverage through its support of seed funds. The participation of CDC-PME stimulates private venture capitalists to invest in these funds, which are of decisive importance, given its upstream position. If private venture capitalists were the only contributors they would not choose to operate in this segment which offers limited profitability.

Comparative Performance

France's venture capital policy appears to have effectively targeted investment in new, small firms. As a percentage of GDP, upstream venture capital investment in France was close to the average for the EU from 1998 to 2001 (Table 3). This contrasts with investment in the downstream stage where France's share was always below the average share in the EU. This suggests that the impact of the policy of supporting venture capital in order to stimulate new innovative firms was focused on firms at the earliest stages.

Comparing the profile of venture capital investment in France with that in Germany and the U.K. gives a further indication of the impact of French policy on high-tech, innovative firms. In the years since the new policy was implemented, 23 to 45 percent of venture capital in France was invested in the high-tech sector. This is roughly the same or a little larger than the proportion in the U.K. (22-39 percent), but it is definitely less than the 40-50 percent of venture capital investment in Germany that goes to high-tech sectors (Table 4). Also, about one fifth of French venture capital is invested in upstream stages. This is a somewhat smaller share than goes to upstream stages in Germany (25-35 percent), but it is well above the share of upstream investment in the U.K., where a preponderance (53-76 percent) is invested in later stage, buyout operations. Thus, France lies somewhere between Germany and the U.K. in the portion of venture capital investment that goes to support early-stage and high-tech firms.

In terms of the role of the public sector in venture capital, France is still behind most of its neighbors. In 1999-2001 the public sector accounted for less than five percent of private equity investment in France compared with almost fifteen percent in Germany. The public

sector's share of private equity investment is much higher in Belgium and other European countries (Schertler 2001, p. 79).

Co-evolution of Venture Capital and the Financial System

The specificities of a country's financial system influence the characteristics of venture capital. For example, in contrast to the situation in the United States and the U.K., in France and Germany banks supply a large portion of venture capital funds (Table 4). Also, in France, semi-public institutional investors, such as the CDC, were a significant force stimulating venture capital activity, while insurance companies were not. Overall, then, the French financial system, which is bank-centered as well as subject to public sector intervention, has had a mainly positive effect on the emergence of venture capital oriented toward upstream investment. At the same time, we should recognize that the emergence of venture capital financing has undeniably influenced the French financial system as a whole. It has pushed the system to become more market-based, with a growing role for capital markets and the introduction of certain financial tools such as the distribution of shares rather than dividends and remuneration in the form of stock warrants.

Recommendations and Continuing Issues

The major problems faced by venture capital in France at the beginning of the 2000s arise on the demand side rather than the supply side. According to many entrepreneurs, the creation of a start-up looks like an obstacle course. Thus, in addition to continuing to support early-stage funding, policymakers should work to reform the administrative procedures regulating the creation of firms and consequently to a reduction in transaction costs.

On the supply side the main issues for policymakers involve avoiding illusion and excess in support of venture capital. On one hand, it is illusory to believe that the public support of seed funds can be only a temporary policy measure. The activity of providing seed funds, which includes giving advice and multiform support to firms in the process of creation, cannot produce sufficient profits to survive without public aid. As long as the links among innovative SMEs, public research, and large firms remain weak, private venture capitalists

will only be able to select a small number of the most promising projects. The public authorities must recognize the crucial role played by incubators and seed funds in assisting new technologies and the ongoing need for public support of these activities. Start-up firms cannot be profitable at the seed stage, and incubators provide critical services, as they help to formulate the business strategy and create a new enterprise. The positive external effects on innovation justify allocating public funds to incubators, that is, to agencies specialized in providing finance and services to start-up firms.

On the other hand, policymakers also must take care not to provide excessive support. Excess is likely to arise in the context of a reactive policy. Private sector actors involved in financing innovation continue to escalate their demands despite the numerous public measures already in place to promote venture capital. Certain measures could almost be seen as “welfare aid” to the private sector. This is particularly the case of the co-investment fund for TBSFs (FCJE), which was created in 2001 as a response to the divestment difficulties venture capitalists were having because of the downturn in the capital market. It is debatable whether public funds should be used for this purpose since venture capital is a cyclical activity and private actors must therefore learn to cope with turns in the economic situation.

It is only a slight exaggeration to say that every public decision-maker in France dreams of transplanting a Silicon Valley to his or her region. The vision of recreating many Silicon Valleys all over France does not take into account the reality that venture capital requires a concentration of key actors and a certain critical mass. Venture capital is characterized by the provision, with the prospect of very high returns, of a large volume of equity capital and frequent advice to young firm-projects specialized in high technology, with rapid growth potential, which presupposes that the target market is global. A global scale is an inherent aspect of the U.S. model of venture capital-driven innovation, and because Europe is broken into many national markets, individual European countries are handicapped in adopting this model for stimulating innovation. Multiplying the number of pseudo-Silicon Valleys can only result in a waste of public funds and the return of financial practices that have already failed,

as demonstrated by the bankruptcy of Regional Development Companies (SDR) or the difficult beginnings of venture capital, which suffered from insufficient capital volume per project. The drift towards public support through a multitude of small-scale, geographically dispersed projects particularly threatens seed fund managers and regional public decision-makers.

The support of venture capital funding can generate losses, because the failure rate for innovative SMEs is very high. Innovation is a winner-take-all competition and the losers disappear. This competition involves duplication of venture capital efforts as well as of R&D activities. A good example is the U.S. computer data storage industry during the mid-1980s, where “In all, 43 start-ups were funded in an industry segment that could be expected in the long run to support perhaps four. Thus, “failure” is at the very least endemic to the venture capital process, an expected commonplace event” (Gorman and Sahlman 1989, p. 238). Excessive public support can lead to an over-accumulation of capital and result in the creation of firms that are more or less empty shells and in the entry of incompetent venture capitalists. In other words, excess public support can lower the quality of demand and supply of venture capital. Excess capital fosters market instability, either upstream in the venture capital market or downstream in the financial markets.

At the same time, financial market instability influences the supply of venture capital funds. Statistical analysis of venture capital activity in the United States has demonstrated that the frequency of exits by venture-capital providers through initial public offerings (IPOs) is positively correlated, with a time lag, with the amount of funds raised by venture capital organizations (Black and Gilson 1998).¹³ Financial market instability creates uncertainty about how soon investors can exit through the capital market. In the euphoric atmosphere that lasted from summer 1999 to spring 2000, venture capitalists were able to recover their investments prematurely by listing firms onto the capital market before they had reached the break-even point. This early divestment through IPOs enabled venture capitalists and

13. Regression shows that the number of IPOs in year X correlates strongly with new contributions in the following year (X+1).

upstream investors to transfer the high risk of failure of these TBSFs to the capital market . Symmetrically, stock market downturns prolong the term of immobilization of investments by hampering divestment by venture capital organizations. For long-term projects such as investment in a start-up firm, financial market variability reinforces uncertainty about the investment results.

To guard against the excesses that led to the bursting of the financial bubble together with the crash in new technology share prices, policymakers must tighten regulations concerning IPOs. To be listed on a capital market is not necessarily a panacea for an innovative, high-tech firm. Premature admission can result in bankruptcy for a healthy firm that cannot attract capital from private savings. Policymakers should work to reform the administrative procedures regulating conditions for listing on new markets. For instance, a given number of years of activity should be required and never-profitable firms should not be allowed.

The Role of Pension Funds in Developing Venture Capital

The combination of a market-based financial system and privately managed pension funds is generally recognized as the ideal context for the development of venture capital. France has neither private nor public pension funds, and demands to introduce pension funds regularly come to the fore.¹⁴ The introduction of some kind of funded pension scheme in France is seen as particularly significant for the development of venture capital, given the importance of these institutional investors as a source of venture capital in the United States.

According to one argument, pension funds are the only vector that possesses horizons of liquidity and profitability and a level of intermediation suited to channeling large amounts of savings into venture capital funds. The possibility of investing pension fund assets in venture capital firms would encourage the development of long-term savings, which is considered to be insufficient at the present time. Given the huge volume of pension assets under

14. France's social security system includes a national pension plan, which is not, strictly speaking, private. It is managed by employers' organizations and employees' unions. The plan is unfunded, with resources coming directly from current salaries. Thus, the French system does not involve the

management, reallocating even a small percentage could generate a considerable amount of venture capital at relatively low risk to the pension assets. A second argument is that the absence of pension funds as a source of financing not only deprives venture capitalists of considerable resources, but also renders French venture capital activity more and more dependent on the decisions taken by large, foreign pension funds.

Despite these claims, we do not observe a systematic empirical correlation between the dynamism of venture capital activity and the existence of pension funds. For example, the Scandinavian countries, Canada, and Israel all have active venture capital markets with little participation by pension funds. Moreover, the case of the U.K., where pension fund managers are reluctant to finance venture capital operation suggests that regulation of pension funds is the important factor in the participation of these institutional investors in venture capital in the United States. In fact, the degree of risk aversion in the capital allocation strategies of pension fund managers varies from one country to another, depending on the regulations governing pension funds and the manner in which they are interpreted. In the United States both regulation and interpretation have encouraged riskier investments. Under their interpretation of the 'Prudent Man rule' of the ERISA Act, managers attempt to maximize returns by diversifying their portfolios as much as possible, and consequently by investing in high-risk activities. In addition, managers of defined-contribution pension funds, which have been developed since the beginning of the 1980s, invest massively in shares, including growth stocks. In the U.K., on the other hand, retirement plan assets are mainly in defined-benefit pension funds, which invest in securities with a low risk of variation in returns. In addition, U.K. regulators impose minimum investment criteria on pension funds to protect pensioners. The effect of these measures has been to orient pension fund portfolios towards British government bonds and away from higher-risk investments such as venture capital funds (Mayer 2001).

Moreover, in the United States, pension funds were not the only factor in the dynamism

of venture capital in the United States. During the New Economy boom, venture capitalists attracted many other types of investors, and in 1999 pension funds supplied well less than half (43 percent) of venture capital (NVCA).

The claim that French venture capital organizations are becoming ever more dependent on foreign pension funds is an exaggeration. In fact, according to the EVCA (European Venture Capital Association), more than three-quarters of capital is raised domestically.¹⁵ Foreign pension funds contributed only seven percent of capital investment funds in France in 2001. While introducing pension funds in France would undeniably increase the supply of venture capital, it is not at all clear that these funds would be invested within France. French pension funds would follow the same investment strategy as American and British funds, which is to seek competent, well-established venture capital teams and avoid the newer, less experienced, and therefore riskier, venture capital teams in France, the very ones that have the greatest difficulty in raising capital. Thus, the introduction of pension funds would contribute only marginally to the dynamism of national venture capital activity in France. Furthermore, whatever impact they might eventually have would not be felt for a long time because, initially, French pension funds would probably adopt particularly prudent investment strategies.

Another reason to question the potential of pension funds to have a significant impact on venture capital activity is the relative failure of the effort to encourage insurance companies to invest in venture capital through the DSK contracts instituted in 1998. The theory was that life insurance funds, with an investment horizon of eight years, represented the second best vehicle, after pension funds, which have an investment horizon of thirty years, for allocating savings to support venture capital. But this program generated only one-tenth the amount of investment expected. The disappointing response of the insurance companies was attributed to the absence of a "culture" for investing in venture capital organizations. We could expect a similar disappointing result from introducing pension funds, since they are also managed by

15. It should be noted that these statistics concern capital investment operations and not just venture capital operations (financing of start-ups).

insurance companies.

To sum up, the argument that they are the ideal vehicle for venture capital supply provides insufficient grounds for introducing pension funds that would affect the overall structure of retirement plans.

CONCLUSION

Public policy to support venture capital falls within the much wider scope of policies designed to keep up with the wave of innovation driven by the new technologies. In countries where spin-offs from large firms do not, fundamentally, form part of the main strategic orientation of technological development, innovation policies entail promoting the emergence of small, innovative firms. Recognition of the European handicaps has motivated public authorities to implement long-term measures to favor the transfer of technology between public research institutions and the private sector. Incubators and seed funds are a response to deficiencies in the market, such as capital rationing away from small projects or the need for advice on the creation of firms. Policy support for venture capital has the specific goal of encouraging new actors and new practices; it does not aim to subsidize incumbent firms or industries.

The emphasis we place in this study on the relationship between the financial and the non-financial elements of a national system of innovation leads us to discuss the concept of national financial system. We argue that this concept, which is often used to contrast market-based and bank-based financial systems, tends to confer too much importance on the financial structure as a means of explaining the comparative advantages of a country. Focusing on national financial characteristics can lead to erroneous predictions about the development of venture capital activity. Thus, although in theory the U.K. has an advantage over Germany due to the nature of its financial system, in practice this advantage cannot be observed for the upstream stages of firms, because British venture capital investors prefer lower-risk segments. The case of Germany demonstrates that interventionist public policy can help a country to overcome the initial handicaps arising from its national financial system.

Venture capital activity that has emerged outside of the United States exhibits distinct

characteristics, which reflect the adaptation of the original model to local factors and constraints. Three such adaptations can be mentioned. First, in many European countries, the public authorities play a decisive role in the seed stage, thus replacing the American-style business angels, who are scarce in countries that lack a history of entrepreneurial culture. Consequently, the typical Anglo-Saxon funding pattern local savings, business angel, venture capital, IPO or takeover by large firm—has been replaced by the following pattern: local savings, seed funding, venture capital, admission onto the capital market or takeover by large firm

Second, outside the United States, venture capital activity may or may not be built onto a specific financial market. Due to a combination of factors during the 1990s, venture capital and clusters of high-tech start-ups emerged in Israel and some other smaller countries. New firms in these countries were able to overcome the absence of an active national financial market because of the possibility of listing on the NASDAQ.

Third, the average size of venture capital investments in Europe is considerably smaller than in the United States, although there is little agreement on the optimum size. Large investments entail high-value exit through IPO or M&A which may be unrealistically high given the current economic climate, while small amounts may not be sufficient to cover the venture capitalist's management costs and adversely affect its performance.

Observing how the U.S. model was adapted in Europe and other countries leads us to two conclusions about what is important for a country to succeed in developing venture capital financing. First, the expertise of the actors involved is a decisive factor in the development of venture capital activity, and a lack of technological expertise on the part of venture capitalists is a crippling obstacle. When this type of equity financing was developing in the United States, managers of venture capital organizations were often former managers of start-up firms. Cooperative relationships between individuals involved in financing and technology facilitated the communication of know-how concerning the valuation of firms, the kind of advice that new firms require, and the like. In the U.S. and other countries, such as Israel, the appearance of secondary actors (consultants) offering their services through

networks helped the primary actors (venture capitalists and entrepreneurs) develop their expertise. Moreover, in Israel and some other countries as well as in the United States, secondary actors (consultants) appeared to help the primary actors (venture capitalists and entrepreneurs) develop the necessary expertise.

Second, the effectiveness of a policy to support venture capital depends on its coherence with policies on technology, as studies of innovation systems and co-evolution have demonstrated. In the United States, a wide range of factors including government regulations concerning the Nasdaq, pension fund managers, and intellectual property rights as well as the institutional environment all favored the exceptional development of venture capital in Silicon Valley. Similarly, Israel's interventionist policy can be analyzed as a portfolio of coordinated policies that involved both incentives and institutional changes. Because the institutional and policy context in which venture capital financing develops is country-specific, policymakers cannot expect to transpose a successful model from another country simply by implementing identical policies. Imitation of measures observed in another country can only be effective if it is coherent with and respects the rules and practices of the key actors in the recipient country. French policy seems to be fruitful.

GLOSSARY

- AFIC:** Association française des investisseurs en capital (French association of capital investors)
- ANVAR:** Agence Nationale pour la Valorisation de la Recherche (National agency for the promotion of research)
- BDPME:** Banque de Développement pour les PME (Development Bank for SMEs)
- BSA:** Bons de Souscription d'Action (stock warrants)
- BTU:** Beteiligungskapital für kleine Unternehmer (Development Bank for SMEs)
- Buy-out:** includes leverage/management buy-out and leverage/management buy-in as well as acquisition of companies by employees. Capital is provided to enable the incumbent management, or a new management team, and their investors to acquire an existing company. Funding may also be intended to create a holding company that would acquire one or more existing firms.
- Captive structures:** structures for which all or a majority of the capital comes from the group to which they belong (bank, insurance company, industrial group)
- CDC:** Caisse des Dépôts et Consignations (French financial institution)
- CIR:** Crédit d'impôt recherche (tax credit for research)
- Downstream venture capital:** refers to investments made in firms in the expansion stage
- EIB:** European Investment Bank
- EVCA:** European Venture Capital Association
- Expansion stage:** when the firm has reached the break-even point and started making a profit. The funds supplied at this stage will be used to increase production capacity and sales force, develop new products, finance take-overs, and/or increase working capital. This term often includes bridge financing and financial restructuring operations
- FCJE:** Fonds de Co-investissement dans les jeunes entreprises (co-investment funds for TBSFs)
- FCPI:** Fonds Communs de Placement pour l'Innovation (mutual investment funds for innovation)
- FCPR:** Fonds Communs de Placement à Risque (venture capital mutual investment funds)
- FPCR:** Fonds Public pour le Capital Risque (public funds for venture capital)
- Independent structures:** autonomous structures that raise funds from diverse institutional investors, all of whom are minority interests. The decision-making structure is independent.
- MENRT:** Ministère de l'Éducation Nationale, de la Recherche et de la Technologie (Ministry of national education, research and technology)
- NICT:** New information and communication technologies
- NVCA:** National Venture Capital Association
- SBA:** Small Business Administration
- SBIC:** Small Business Investment Corporation
- SCR:** société de capital-risque (venture capital company)
- Seed funding:** funding provided for entrepreneurs who aim to establish a firm
- Seed stage:** when a firm is just starting activity; funding is allocated for product development.

SFI: société financière d'innovation (financial company for innovation)

Start-up stage: once a firm has completed product development and needs capital to start production and marketing.

TBSF: technology-based small firm

UNICer: Union Nationale des Capital Risqueurs Régionaux (national union of regional venture capitalists)

Upstream venture capital: investments made in the seed, creation, and post-creation stages

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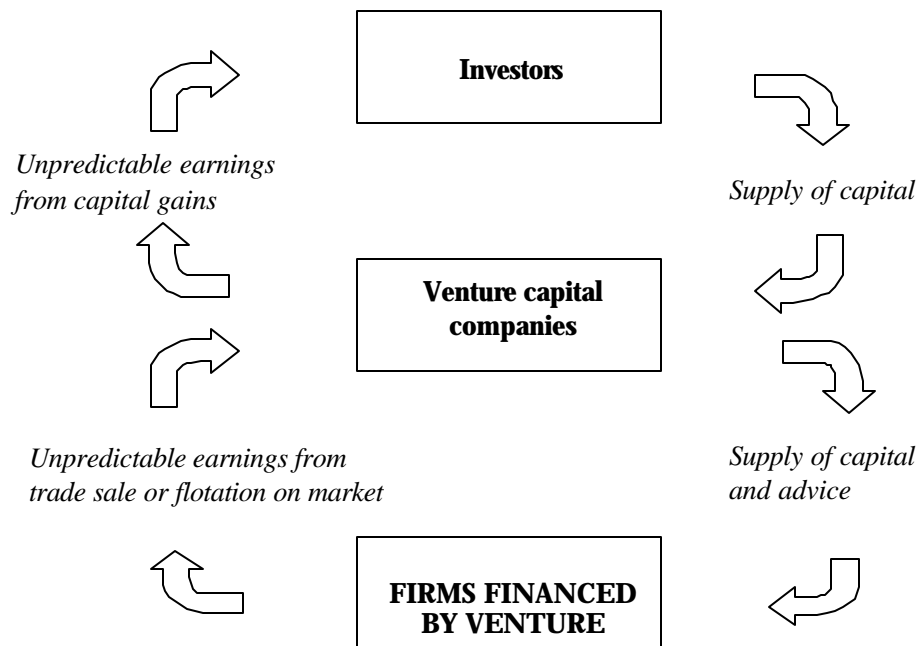
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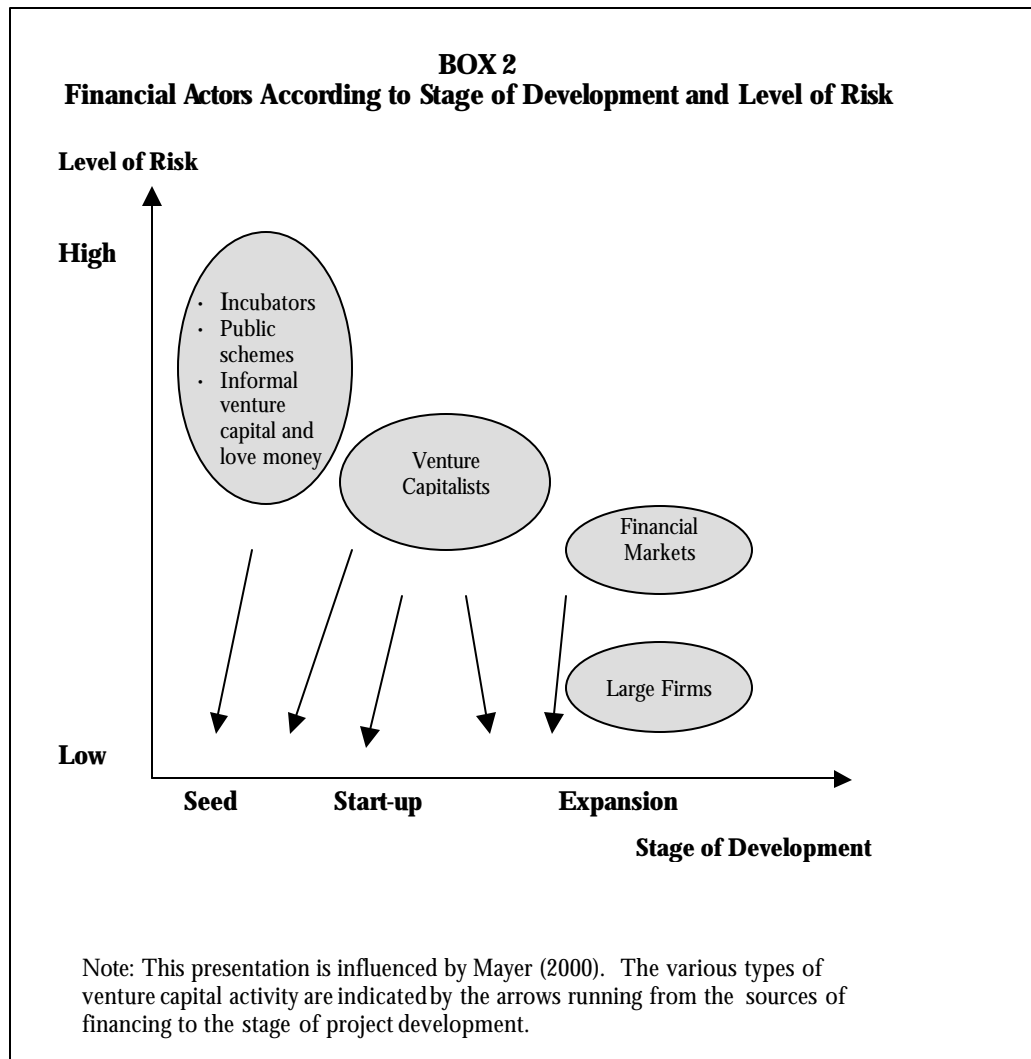
BOX 1 **The Actors in Venture Capital**

Venture capital activity is a new type of financial intermediation that differs from banks. The main actors are: investors who supply the capital, venture capital companies, and TBSFs.

Venture capital companies raise funds from investors and buy shares in innovative TBSFs, primarily ones in the NICT (new information and communication technologies) and biotechnology sectors. Venture capital companies contribute advice as well as financing. This non-financial aspect of venture capitalists' capabilities is decisive for the dynamism of the activity.

Venture capital companies divest after an average of five years. The most common modes of divestment are trade sale and flotation on the capital market. Therefore, two additional actors appear in the downstream stage of venture capital activity: markets specialized in growth stocks and large firms.



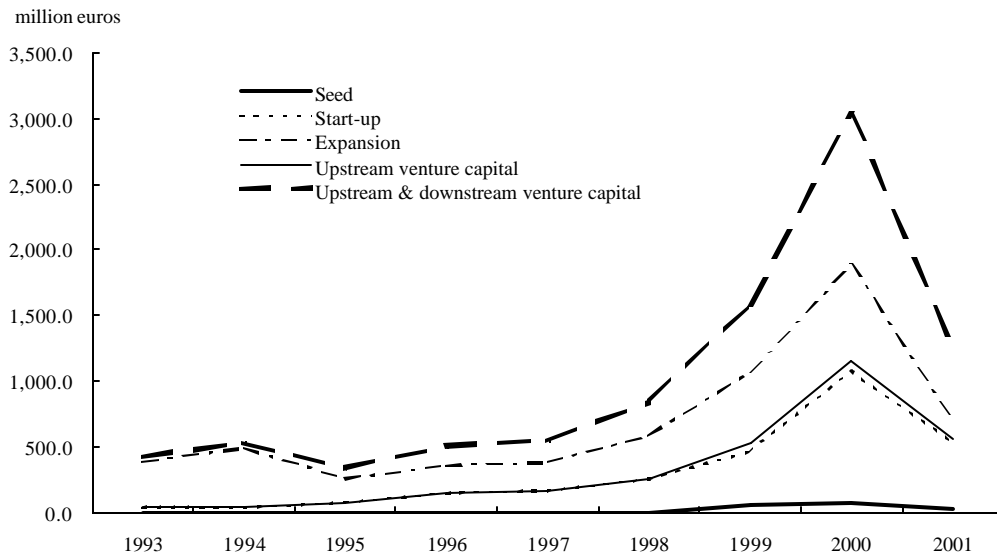


BOX 3
The FPCR (Public Fund for Venture Capital) in Numbers
(end June 2002)

- €110 million invested out of €135 million available in the fund
- 21 venture capital mutual investment funds (FCPRs) supported, which raised an additional €823 million, making a leveraging ratio of 7.5 times the FPCR investment
- 19 active FCPRs have invested nearly €400 million, raising the additional capital from banks (26%), public institutions excluding the FPCR (17%), retirement funds (10%), and pension funds (7%).
- 40% of supported FCPRs' investments in Internet-related activities and 18% in life sciences.
- Nearly half the investments of FCPRs are made at the seed stage.

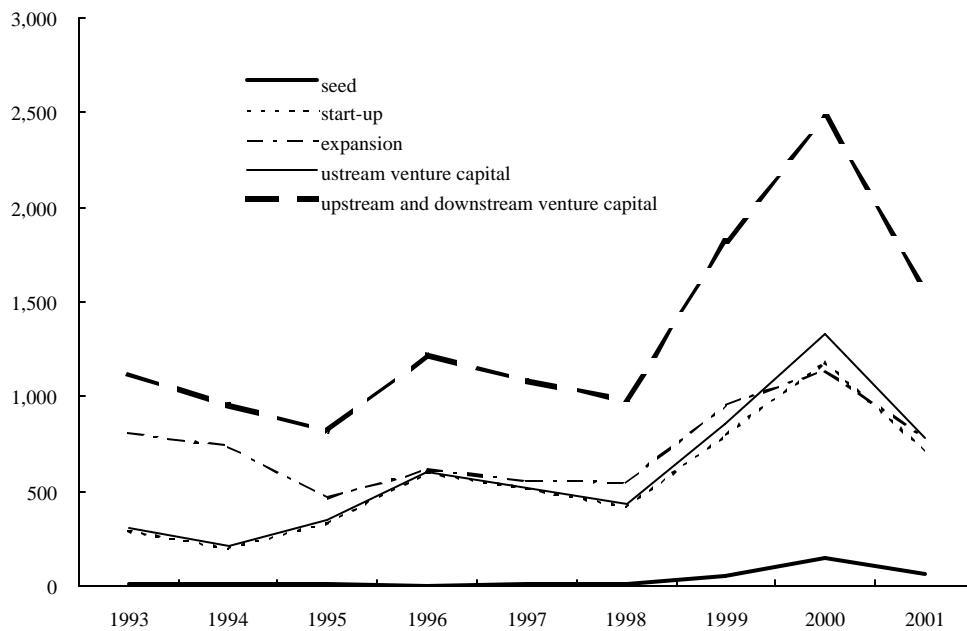
Source: <http://www.fpcr.fr>

FIGURE 1
Venture Capital Investment Flows in France from 1993 to 2001



Source: AFIC.

FIGURE 2
Number of Venture Capital Deals in France by Stage, 1993-2001



Source: AFIC

TABLE 1
Typology of Financial Systems

	Bank-based system	Market-based system
Type of corporate governance	Stakeholders	Shareholders
Nature of selection	Customer relations	Diversification of portfolio
Nature of innovation	Incremental	Radical
Importance of high technology in the economy as a whole	-	+

Source: Based on Dosi 1990 and Christensen 1999.

TABLE 2
Venture Capital Benchmarks for the United States, the UK, and Europe

	United States	UK	Continental Europe (Germany, France)
Financial system characteristics:			
Market-based = +; bank-based = -	+	+	-
Specific capital market	+++	+	++
Pension funds	++	++	--
Regulations favorable to venture capital	+	+	+
Presence of business angels	+	+	-
Innovation system characteristics:			
Intensity of links between large incumbents and innovative SMEs	++	+/-	+/-
Close links between universities and the private sector	++	+ / -	-
Public sector characteristics:			
Public program of financial support	SBA and SBIC	No targeted program	Germany: BTU France: FPCR

Note: See the glossary for definitions of acronyms.

Source: Dubocage 2001

TABLE 3
Venture Capital Investment in Europe and the United States by Stage, 1998-2001
(Number of projects, millions of euro, and percent of GDP)

	1998			1999			2000			2001		
	Nbr	M€	% GDP	Nbr	M€	% GDP	Nbr	M€	% GDP	Nbr	M€	% GDP
Seed and start-up stage												
France	426	258	0.02	742	515	0.04	1,097	1,155	0.08	623	562	0.04
Germany	516	465	0.02	703	1007	0.05	1,094	1,653	0.08	835	1,154	0.06
UK	129	177	0.01	123	260	0.02	462	1,580	0.10	448	929	0.06
Europe (EU 15)	2,225	1,553	0.02	2,991	3,048	0.04	7,183	6,353	0.07	6,107	3,988	0.05
United States	1,809	6,499	0.08	2,448	14,466	0.17	3,333	26,777	0.25	1,172	11,274	0.10
Expansion stage												
France	516	583	0.04	789	1,233	0.09	1,033	1,884	0.13	631	720	0.05
Germany	548	846	0.04	723	1,698	0.09	1,110	2,142	0.11	1,021	1,555	0.08
UK	636	1,466	0.11	740	2,545	0.19	577	4,398	0.28	450	1,736	0.11
Europe (EU 15)	3,022	4,129	0.05	3,435	8,343	0.10	4,263	12,211	0.14	3,469	7,633	0.09
United States	1,892	12,642	0.16	2,481	36,583	0.42	3,723	71,087	0.67	2,801	34,083	0.30

Source: EVCA, NVCA, 1999, 2000, 2001, 2002.

TABLE 4
Comparison of Venture Capital in Germany, the UK, and France, 1999-2001
 (Percent)

	Germany			1999	UK			France		
	1999	2000	2001		1999	2000	2001	1999	2000	2001
Composition of investors										
Banks	40	29	32	26	10	14	25	39	43	
Government agencies	14	16	16	2	4	4	3	2	4	
Pension funds	9	6	3	31	40	42	9	17	7	
Distribution of investment by sector										
High-tech	43	53	41	22	39	30	29	45	23	
Distribution of private equity investment by stage										
Upstream venture capital	32	35	26	2	12	13	19	22	17	
Downstream venture capital	50	45	35	20	34	26	38	35	21	
Buy-out	15	18	37	76	53	56	38	38	59	
Divestment										
IPO	18	12	8	26	7	8	17	25	17	
Trade sale	24	40	20	22	24	29	58	39	54	
Write-off	20	18	36	8	5	23	3	6	10	

Source: EVCA 2000, 2001, 2002

Table 5
French Public Policy Relating to Venture Capital up to 1996

Legal framework	Public institutions	Capital markets
1955: Creation of Sociétés de développement Régional (SDR – Regional development companies). At present they no longer exist.	1968: Creation of the ANVAR (Agence Nationale de Valorisation de la recherche - National agency for the promotion of research). In 1979, a role as provider of financial aid for innovation was added to its role of promotion.	1983: Creation of the Second Marché for SMEs.
1972: Creation of Sociétés Financières d'Innovation (SFI – Financial companies for innovation)	1982: Creation of SOFARIS, which provides guarantees to cover financial risk relating to bank loans and equity contributions supplied by financial institutions in favor of SMEs.	1996: Creation of the Nouveau Marché, a member of Euro-NM. Total equity should reach €1.2 million and 100,000 securities are to be issued.
1975: Creation of Instituts Régionaux de Participation (IRP – Regional equity investment institutes). Creation of Siparex in 1977 by R. Barre. The legal status of IRP was terminated in 1985 with the creation of Sociétés de Capital Risque (SCR – venture capital companies).		
1983: Creation of the Fonds Communs de Placement à Risque (FCPR – venture capital mutual investment funds). Their structure is similar to that of American “limited partnerships”.	1991: Creation of the fonds de garantie de développement technologique (technological development guarantee funds) with the SOFARIS	
1985: Creation of the legal status of Sociétés de Capital Risque (SCR – venture capital companies), providing an incentive framework for specialist financial companies (IRP).		
1991: The legal status of SDR (SCR structure) and SFI are made more flexible through the “General Program for SME/SMI”		

Source: Based on Lachmann 1999.

TABLE 6
Types of Government Incentive Program Introduced Since 1996

Type	Objective	Measures
Tax incentives	To provide financial incentives:	
	<ul style="list-style-type: none"> • for private individuals investing in SMEs or venture capital funds 	<ul style="list-style-type: none"> ➤ Deferral of capital gains tax (1998) ➤ Creation of "DSK" contracts (1998)
	<ul style="list-style-type: none"> • for creating companies 	<ul style="list-style-type: none"> ➤ Introduction of stock warrants for founders of start-ups (1998).
and / or		
Legal incentives	To make official regulations more flexible for:	
	<ul style="list-style-type: none"> • formation of venture capital organizations 	<ul style="list-style-type: none"> ➤ Tax advantages related to FCPI (1997) ➤ Introduction of simplified procedure for FCPR (2000)
	<ul style="list-style-type: none"> • founders of start-ups 	<ul style="list-style-type: none"> ➤ Innovation Act (1999)

TABLE 7
Types of Direct Government Intervention Since 1996

Objective	Type and means	Institutions
* Encourage the emergence of new venture capital professionals	Direct government contributions of equity capital	<ul style="list-style-type: none"> ➤ Public fund for venture capital (FPCR), 1998 ➤ Public fund for promotion of venture capital, 2000
* Prevent the withdrawal of venture capital	Investment in start-ups	<ul style="list-style-type: none"> ➤ Co-investment fund for TBSFs (FCJE), 2001
* Reduce risk	Bank loans and equity capital guarantees	<ul style="list-style-type: none"> ➤ BDPME, 1997 ➤ SME-capital guarantee funds endowed by the CDC-PME managed by SOFARIS (subsidiary of the BDPME) ➤ Guarantee funds for biotechnology firms, managed by the BDPME (SOFARIS), 2001

TABLE 8
Venture Capital and the CDC

	CDC Participation	CDC-PME	FPCR Public fund for venture capital	Public fund for promotion of venture capital	FCJE Co-investment fund for TBSFs
Management			FPCR, subsidiary of CDC-PME	FPCR, subsidiary of CDC-PME	FPCR, subsidi ary of CDC-PME
Activity	Private equity	Public interest	Public interest	Public interest	Public interest
Origin of funds	80% CDC 20% third parties	100% CDC	66% government 33% EIB	33% government 33% EIB 33% CDC-PME	33% EIF 33% CDC-PME 33% government
Purpose	Management via investment funds including: Fondinvest, CDC- participation, etc.	Support of regional development capital Support of seeds via aid for the constitution of seed funds	Funds granted to FCPRs that invest in innovative French firms less than 7 years old.	Funds granted to FCPRs that invest in innovative French firms less than 7 years old.	Funds granted to TBSFs during their second round.

Note: See the glossary for definitions of acronyms.

Source: <http://www.cdcpme.fr> and <http://www.fpcr.fr>.