POLICY FORUM: ECONOMICS

The Problematic Venture Capitalist

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The U.S. federal government has played an active role in financing new firms, particularly in high-technology industries, since the Soviet Union's launch of the Sputnik satellite. These efforts are considerable; for example, the sum of the financing provided through several dozen public programs in 1995 was $2.4 billion. In recent years, many European and Asian nations have adopted similar initiatives. For example, the OECD estimates (*1*) that Germany created about 800 government financing programs for small firms over the past two decades. Although the precise structures of these programs differed, the efforts have been predicated on two shared assumptions: that the private sector provides inadequate capital to new firms and that the government can identify firms for which investments will ultimately yield high social or private returns.

The U.S. Congress is now reconsidering the largest such program, the Small Business Innovation Research (SBIR) program. This program, first enacted in 1983, sets aside 2.5% of all federal extramural R&D expenditures, or about $1.1 billion, to fund small, high-technology businesses. Under consideration are proposals to make the program permanent and to increase funds allocated to the program.

Although the SBIR program has enjoyed some successes to date, the push to make the program permanent and to expand its size is problematic. First, the financing environment for young high-technology firms has changed since the program's enactment, with the dramatic expansion of the venture capital industry. Second, like many other "public venture capital" efforts, the program has been subject to distortions in the selection of awardees. These concerns suggest that the SBIR program should continue to be a temporary one, with the burden of proof on those who wish to continue the program.

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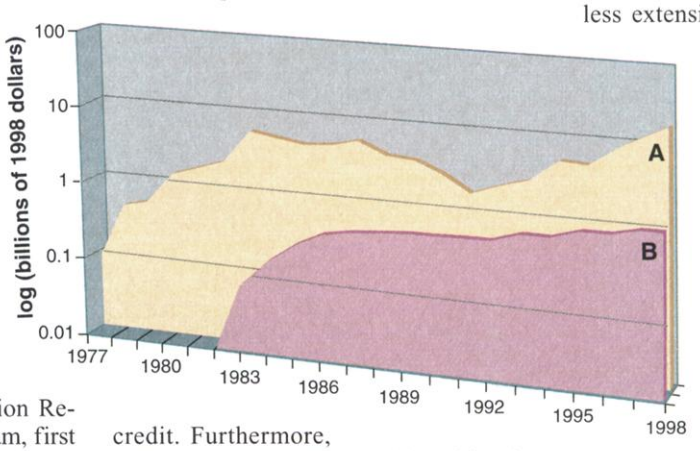
Why Public Venture Capital?

Financing young firms is difficult because of the information problems that surround them. These manifest themselves in two ways. The first, uncertainty, is a measure of the array of potential outcomes for a company or project. By their very nature, young high-technology companies are associated with significant levels of uncertainty. Uncertainty has a negative effect on the willingness of investors to contribute capital and suppliers to extend credit. Furthermore, if managers are averse to taking risks, they may make the wrong decisions in uncertain environments.



Venture capital fundraising (A) and SBIR financing (B), 1977–1998, in billions of 1998 dollars (logarithmic scale) (*2*, *5*).

The second factor, asymmetric information, is distinct from uncertainty. Because of their day-to-day involvement with the firm, entrepreneurs know more about their companies' prospects than investors. Various problems develop in settings with information asymmetries. In particular, the only entrepreneurs who may be willing to offer investors equity may be those who are pessimistic about their companies' prospects. These problems often deter traditional financiers of firms, such as banks and mutual funds.

The financial intermediary that specializes in addressing these problems is the venture capital organization. The first modern venture capital firm was American Research and Development, formed in 1946. It established a template that many subsequent groups have emulated. To address the problems that preclude other investors from financing small high-technology firms, business plans are intensively scrutinized, with only about 1% funded. The decision to invest is frequently made conditional on the participation of another venture capitalist. Instead of the common stock typically sold in public stock offerings, the venture capitalists demand preferred stock with numerous restrictive covenants and representation on the board of directors. Entrepreneurs are forced to return repeatedly for additional capital to ensure that the money is not squandered. Venture capitalists intensively monitor managers, often on a daily basis, and hold frequent board meetings. In short, the mechanisms that are bundled with the venture capitalists' funds are critical in assuring that they receive a satisfactory return. [For a detailed review, see (*2*)].

At the same time, there are reasons to believe that despite the presence of venture capital funds, there still might be a role for public programs. Private venture funds tend to be highly concentrated in certain industries and locations. In areas less extensively examined by venture investors, public venture capital programs may play two important roles. First, the awards may certify firms to outside investors and lead to private financing for promising firms that would not otherwise occur. Second, the programs may encourage technological spillovers by supporting firms whose technology may be used by many others.

However, caution about public venture capital is suggested by the extensive economics literature on "regulatory capture" (*3*). These studies document the distortions that may result from government subsidies as particular interest groups or politicians seek to direct subsidies in a manner that benefits themselves. Politicians may acquiesce to transfer payments to companies that are politically connected: for instance, encouraging awards to applicants from their districts, even if the firms are not competitive.

How Has the SBIR Program Performed?

Although the SBIR program has been extensively evaluated, many initial studies were problematic. The case studies and surveys of awardees undertaken by the agencies themselves, the U.S. General Accounting Office, and outside consulting groups such as Gellman Research Associates, PriceWaterhouse, and the National

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Academy of Sciences have the virtue of being relatively straightforward to implement and communicate. Unfortunately, they also have significant limitations. Many awardees may have a stake in the programs that have funded them, and consequently give favorable answers in surveys (especially to subjective questions such as whether commercialization was accelerated). This may be a particular problem in the case of the SBIR initiative, as many small high-technology company executives have organized to lobby for its renewal. Elsewhere, it may simply be very difficult to identify the marginal contribution of a public venture capital award, which may be one of many sources of financing that a firm used to develop a given technology. Finally, as argued by Wallsten (*4*), these evaluation methodologies may have a distorting effect on the selection of firms by program managers, leading to an emphasis on "safe" firms that would have succeeded anyway.

I took an alternative approach (*5*), examining the employment and sales growth of 1435 SBIR firms over a 10-year period. Roughly one-half of the sample received one or more awards in the first three cycles of program; the others were matching firms chosen to closely resemble the awardees. Over this period, the SBIR awardees enjoyed substantially greater employment and sales growth than the matching firms. For instance, the mean sales increase (in constant 1995 dollars) from the end of 1985 to the end of 1995 was $4.0 million for the awardees versus $1.1 million for the matching firms. (This represented a 98% boost in sales for the awardees, but only a 27% increase for the similarly sized matching firms.)

The growth of the awardees did not appear to have been due to the receipt of procurement contracts by these firms or alternative explanations. Although the awardees and matching firms did not differ significantly in the likelihood of receiving venture capital in the years before the awards, in subsequent years the awardees were significantly more likely to receive such financing. The results suggest that these awards played a certification function, providing a "stamp of approval" to early-stage firms that allowed them to raise venture capital financing.

At the same time, two important caveats limit our ability to make broad conclusions about the desirability of expanding the SBIR program or making it permanent. First, the financing environment for young high-technology firms has changed dramatically since the first demonstration SBIR program was put in place by the National Science Foundation in 1977. Venture fund-raising increased dramatically in the early 1980s and again in the 1990s (see the figure on page 977). Much of the initial increase was the result of the U.S. Department of Labor's clarification of the "prudent man" rule in 1979, which enabled pension funds to invest substantial amounts of money in venture capital or other high-risk asset classes. Institutional investors have gradually gained a better understanding of the venture sector, and intermediaries (known as "gatekeepers") have appeared to assist them in the process. Moreover, a large number of innovations addressing the special needs of early-stage firms have appeared, such as "funds-of-funds" specifically designed to invest in funds specializing in start-ups. Thus, even if the SBIR program played an important role in certifying young firms in the early 1980s, it is not clear that the signal that such an award provides today is as valuable; venture capitalists are paying much more attention today to start-ups.

Assessing the impact of the recent changes in the venture capital market on this program is very difficult. By their very nature, programs to fund small high-technology firms must only be evaluated after a considerable time has passed: there is often a significant lag before a start-up generates substantial employment or sales growth. The changing financing environment thus raises important unanswered questions about the continued need for the SBIR program.

The second caveat is that my study highlighted two types of political distortions that appear to affect the program. The first of these was regional: the superior performance was confined to awardees in areas where many new firms were being created, as measured by early-stage venture capital disbursements. For the average SBIR awardee in a Zip Code where at least one firm received venture financing in the early 1980s, inflation-adjusted sales over the next decade grew by $7.7 million, far above the matching firms. The positive effects were much smaller in areas with no venture activity (sales only rose by $1.7 million for the awardees, as opposed to by $1.2 million for the matching firms). Second, companies that received multiple SBIR awards did not perform better—and may have done even worse—than those receiving smaller subsidies did: the awards, which had so positive an influence on recipients of a single SBIR grant, had no positive effect on the winners of large numbers of grants.

These statistical patterns are consistent with issues raised in conversations with firms that have participated in the SBIR program, current and former program managers, and venture capitalists, as well as other public venture efforts such as the Advanced Technology Program. First, the program managers have faced pressure from congressional officials to make geographically diverse awards. The share of funds going to firms in California and Massachusetts—which has consistently been about 40% over the history of the program—has attracted scrutiny from members of Congress unhappy about the awards' geographic concentration. One indication of the political sensitivity of the allocation of SBIR awards may be the fact that in almost every recent fiscal year, all 50 states have received at least one SBIR award. Second, particular companies have demonstrated an ability to capture a disproportionate number of awards. These "SBIR mills"—many of which have staffs in Washington that focus on identifying opportunities for applications—appear to commercialize projects at a significantly lower rate than other firms. Despite repeated discussions of these patterns in government reports [for example (*6*)], this problem has proven difficult to eliminate, as frequent awardees tend to be active lobbyists. Moreover, the literature on political capture suggests that these problems are more likely in large, highly visible programs, as the SBIR effort has increasingly become.

Next Steps

The changes in the venture capital industry over the past decade and the presence of distortions in the award process raise questions as to whether the SBIR program is still effective or necessary. These suggest that the current efforts to make this and other programs permanent, and to expand their scope, are misguided. These programs should remain experimental in nature until rigorous empirical studies show that they have been effective over a sustained period in stimulating innovation, as well as that the political distortions discussed above can be addressed.

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