SMALL BUSINESS INNOVATION RESEARCH PROGRAM

Testimony of

Albert N. Link

Professor of Economics
University of North Carolina at Greensboro

before the

Committee on Small Business
Subcommittee on Healthcare and Technology
The Creating Jobs Through Small Business Innovation Act of 2011
United States House of Representatives

April 7, 2011

Good morning Chairwoman Ellmers, Ranking Member Richmond, and members of the Subcommittee on Healthcare and Technology.

My name is Albert Link and I am a Professor of Economics at the University of North Carolina at Greensboro. It is an honor and a privilege to be here today and to offer observations about the overall economic importance of the Small Business Innovation Research (SBIR) program and, in particular, the role of venture capital in the performance of funded projects and companies.

My areas of research include the economics of innovation, technology-based entrepreneurship, and public sector program evaluation. I have been associated with the Board on Science, Technology, and Economic Policy within the National Research Council (NRC) since the late 1990s, initially as a member of the research team involved with the first assessment of the Department of Defense's (DoD's) Fast Track Initiative,[1] then as a member of the research team involved with the initial assessment of the SBIR program, and most recently through its study of science and technology parks.[2]

The observations that I offer below are based on my general understanding of the SBIR program and on my detailed statistical analyses of data collected through the NRC's assessment of the SBIR program.[3]

Background on the SBIR Program

The SBIR program is a public/private partnership that provides grants to fund private-sector R&D projects. It aims to help fulfill the government's mission to enhance private-sector R&D and to commercialize the results of federal research.

A prototype of the SBIR program began at NSF in 1977. At that time, the goal of the program was to encourage small businesses—increasingly recognized by the policy community to be a source of innovation and employment in the U.S. economy—to participate in NSF-sponsored research, especially research with commercial potential. Because of the early success of the program at NSF, Congress passed the Small Business Innovation Development Act of 1982 (P.L. 97-219).

The 1982 Act required all government departments and agencies with external research programs of greater than $100 million to establish their own SBIR program and to set aside funds equal to 0.20 percent of the external research budget.[4] As part of the 1982 Act, SBIR awards were structured and defined by three phases.[5]

The 1982 Act stated that the objectives of the program are:

(1) to stimulate technological innovation,
(2) to use small business to meet Federal research and development needs,
(3) to foster and encourage participation by minority and disadvantaged persons in technological innovation,[6] and
(4) to increase private sector commercialization of innovations derived from Federal research and development.

Eleven agencies currently participate in the SBIR program, with an annual award amount of approximately $2.5 billion.

Employment Growth from SBIR-Funded Research

Employment growth—jobs—is of great importance in our current economic environment.[7] The average annual rate of employment growth in SBIR-funded companies has grown much faster than the growth rate of the economy as a whole.

Employment growth occurs in funded companies in areas beyond those directly associated with the funded project. In other words, a SBIR-funded project leverages a number of activities of the company allowing it to grow through hiring new employees in areas related to but broader than the specific project.[8]

The average annual rate of employment growth varies among companies and across funding agencies. Generally, those businesses with higher growth rates have:[9]

- patented their intellectual property, and
- acquired Phase III funding.[10]

And, there are no differences in the average rate of employment growth among companies that are owned by women and/or minorities than are owned by men and/or non-minorities.[11]

Commercializing New Technology from SBIR-Funded Research

Commercializing new technology funded by SBIR is an explicit objective of the program, and about 50 percent of funded projects have resulted in new technologies being brought to market, and this percentage is about the same across the five funding agencies studied by the NRC.[12]

The probability of commercializing a new technology varies among companies and across funding agencies. Generally, those businesses that have been successful in commercializing their technology have:[13]

- acquired Phase III funding, U.S. venture capital among DoD- and NIH-funded companies in particular,[14]
- partnered with a university,[15]

And, there are no differences in the average rate of commercialization among companies that are owned by women and/or minorities than are owned by men and/or non-minorities.[16]

The magnitude of the effect of Phase III funding on the probability of commercializing a new technology is noteworthy. For example, among NIH-funded companies the probability of commercializing a new technology nearly doubles when venture capital research funding is available.[17]

Venture Capital Support among SBIR-Funded Projects

A woman and/or a minority owned business that receives SBIR awards does not appear to be disadvantaged in receiving Phase III venture capital investments.[18]

Larger companies do not appear to have an advantage in accessing Phase III venture capital investments.[19]

Need for Continued Evaluation Studies of the SBIR Program

I would again like to thank the Committee on Small Business for allowing me to offer my observations on the overall economic importance of the SBIR program and, in particular, the role of venture capital in the performance of funded projects. I encourage the Committee to move toward a reauthorization of the program and to include in that reauthorization continued evaluation studies of the program with an emphasis on any economic consequences associated with changes in the economic environment or in the composition of applicant or recipient companies.[20]

References

Audretsch, David B., Albert N. Link, and John T. Scott (2002). "Public/Private Technology Partnerships: Evaluating SBIR-Supported Research," *Research Policy*, **31**: 145-158.

Bearse, Peter M. and Albert N. Link (2010). "Economic Implications of Raising the Threshold Funding Limits on U.S. Small Business Innovation Research Awards," *Science and Public Policy*, **37**: 731-735.

Link, Albert N. (2000). "An Assessment of the Small Business Innovation Research Fast Track Program in Southeastern States," in *The Small Business Innovation Research Program: An Assessment of Fast Track*, edited by C. Wessner, Washington, DC: National Academy Press.

Link, Albert N. and John T. Scott (2000). "Estimates of the Social Returns to SBIR-Sponsored Projects" (with J. Scott), in *The Small Business Innovation Research Program: An Assessment of Fast Track*, edited by C. Wessner, Washington, DC: National Academy Press.

Link, Albert N. (2009). "Research, Science, and Technology Parks: An Overview of the Academic Literature," in *Understanding Research, Science and Technology Parks: Global Best Practice*, edited by C. Wessner, Washington, DC: National Academy Press.

Link, Albert N. and Jamie R. Link (2009). *Government as Entrepreneur*, New York: Oxford University Press.

Link, Albert N. and John T. Scott (2009). "Private Investor Participation and Commercialization Rates for Government-sponsored Research and Development: Would a Prediction Market Improve the Performance of the SBIR Program?" *Economica*, **76**: 264-281.

Link, Albert N. and John T. Scott (2010). "Government as Entrepreneur: Evaluating the Commercialization Success of SBIR Projects," *Research Policy*, **39**: 589-601.

Link, Albert N. and John T. Scott (2011). *Public Goods, Public Gains: Calculating the Social Benefits of Public R&D*, New York: Oxford University Press.

Link, Albert N. and John T. Scott (forthcoming a). *Employment Growth from Public Support of Innovation in Small Firms*, Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Link, Albert N. and John T. Scott (forthcoming b). "Employment Growth from the Small Business Innovation Research Program," *Small Business Economics*.

Link, Albert N. and Christopher J. Ruhm (2009). "Bringing Science to Market: Commercializing from NIH SBIR Awards," *Economics of Innovation and New Technology*, **18**: 381-402.

Link, Albert N. and Christopher J. Ruhm (2011). "Public Knowledge, Private Knowledge: The Intellectual Capital of Entrepreneurs," *Small Business Economics*, **36**: 1-14.

Notes

[1] See, Link (2000); Link and Scott (2000); and Audretsch, Link, and Scott (2002).

[2] See, Link (2009).

[3] The Small Business Reauthorization Act of 2000 mandated that, among other things, the NRC conduct "an evaluation of the economic benefits achieved by the SBIR program" and make recommendations to Congress for "improvements to the SBIR program." In its evaluation of the SBIR program, the NRC steering committee charged with the study took several approaches to the evaluation. These approaches included multiple surveys, interviews, and over 100 case studies. The NRC conducted an extensive and balanced survey in 2005 based on a population of 11,214 projects completed from Phase II awards made between 1992 and 2001 by five agencies: Department of Defense (DoD), National Institutes of Health (NIH) within Health and Human Services, National Aeronautics and Space Administration (NASA), Department of Energy (DOE), and the National Science Foundation (NSF). In 2005, these five agencies accounted for 94% of the 1,842 Phase II awards and 98% of the $1.4 billion awarded. Data were obtained from a final sample of 1,878 randomly chosen projects. Much of my analysis of the NRC database was done jointly with my research colleague John Scott, from the Department of Economics at Dartmouth College.

[4] In 1983, the set aside totaled $45 million.

[5] The objective of Phase I is to determine the scientific or technical feasibility and commercial merit of the proposed research or R&D efforts and the quality of performance of the small business concern, prior to providing further Federal support in Phase II. The objective of Phase II is to continue the research or R&D efforts initiated in Phase I. Funding shall be based on the results of Phase I and the scientific and technical merit and commercial potential of the Phase II proposal. The objective of Phase III, where appropriate, is for the small business concern to pursue with non-SBIR funds the commercialization objectives resulting from the outcomes of the research or R&D funded in Phases I and II.

[6] The 1992 reauthorization of the Act broadened objective (3) to focus also on women: "to provide for enhanced outreach efforts to increase the participation of … small businesses that are 51 percent owned and controlled by women."

[7] Recent legislation, as well as a number of recent reports, emphasizes the relationship between job growth and public investments in innovation. See for example the America COMPETES Reauthorization Act of 2010 as well as the National Economic Council, the Council of Economic Advisers, and the Office of Science and Technology Policy's February 2011 report, *A Strategy for American Innovation: Securing Our Economic Growth and Prosperity*.

[8] Over the time period of the data collected from a random sample of projects by the NRC, DoD-funded companies have enjoyed an approximated average annual rate of employment growth of 6%; it was 11% per year among NIH-funded companies, and it was 5% per year among DOE-funded companies. See, Link and Scott (forthcoming a, forthcoming b).
Generalizing to the cumulative number of new jobs created through the SBIR program is ambitious because the data available are averages and the life of funded company is unknown. However, one can conservatively extrapolate from the random sample of projects in the NRC database to conclude that, on average, employment in funded companies has increased by 30 persons per $1 million of SBIR funding over a 10 year period (taking into account projects that were funded but did not succeed on a scientific or technical basis).

[9] There are other agency-specific correlates with the average annual rate of employment growth. For example, growth rates are greater among a random sample of DoD-funded companies that have a university as a research partner and that have previously been granted a Phase II award in a related technology area; they are greater among a random sample of NIH-funded companies in which the SBIR award is a larger percent of their overall R&D budget and that have received U.S. venture capital funding; and among a random sample of DOE-funded companies that have entered into R&D agreements with other companies.

[10] Outside funding includes investments from private investors and inside funding includes own-company funding.

[11] Female owned companies are less likely to patent intellectual property resulting from an SBIR-funded project than are non-white owned companies. See, Link and Ruhm (2011).

[12] See, Link and Ruhm (2009) and Link and Scott (2009, 2010).

[13] The following two generalizations are based on a statistical analysis of the random sample of projects in the NRC database. Those data were collected in 2005 based on Phase II awards between 1992 and 2001. The probability of having commercialized from a funded project by 2005 is greater the older the funded project.

[14] Link and Scott (2009, 2010) emphasize that the presence of outside funding should be positively correlated with commercialization success for at least three reasons.
One reason is that outside private investors have useful information about the commercial prospects of the output of a Phase II project and they signal that information by investing in the project that are likely to be most successful. Relatedly, Link and Ruhm (2009) make the point that when outside investors do invest at least two hurdles have been cleared. One hurdle is that the company's project was selected by the investor among all projects to be scrutinized, and the second hurdle is that the project was selected among all those scrutinized.
A second reason is that the presence of outside investors provides useful business and management guidance to small, and often newly formed companies.
And the third reason is that companies that have taken an internal assessment of a project's commercial potential, and thus believe that their project will be successful, may be able to identify private outside private investors more easily.

[15] Link and Ruhm (2009) have only studied the university effect for NIH-funded companies.

[16] Link and Ruhm (2009) have only studied the gender/race effect for NIH-funded companies.

[17] Link and Ruhm (2009) estimated that the probability of commercializing a new technology from a random sample of NIH-funded project with $0 of additional funding is about 25 percent. Venture capital support increases the probability of commercialization by about 26 percentage points. And, university involvement increases the base probability by about 12 percentage points.

[18] For example, among the random sample of DoD-funded projects: 3.6% of a woman-owned businesses received Phase III venture capital support, 2.2% of a minority-owned businesses received Phase III venture capital support, 0% of businesses owned by a minority woman received Phase III venture capital support, and 3.3% of other businesses received Phase III venture capital support. Among the random sample of NIH-funded projects: 0% of a woman-owned businesses received Phase III venture capital support, 7.7% of a minority-owned businesses received Phase III venture capital support, 0% of businesses owned by a minority woman received Phase III venture capital support, and 3.5% of other businesses received Phase III venture capital support.

[19] For example, among the random sample of DoD-funded projects 1.5% of companies with less than 8 employees (mean 3.8 employees) received Phase III venture capital, 6.9% of companies with between 8 and 22 employees (mean 13.6 employees) received Phase III venture capital, 2.5% of companies with between 22 and 64 employees (mean 38.9 employees), and 2.6% of companies with greater than 64 employees (mean 183.8 employees) received Phase III venture capital.

[20] See Link and Link (2009) and Link and Scott (2011) for a discussion of the economic as well as managerial importance of program evaluation.