

Chapter 2

State Programs to Promote the Growth of Innovative Firms in the United States – A Taxonomy

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Abstract This article provides an overview of state programs designed to promote innovation—especially to those targeted at growing innovative firms throughout the United States. It argues that governments can best promote business growth by improving the working of the output and resource markets so that entrepreneurs can exploit the market opportunities and that by investing in the resource markets to increase the supply of resources, innovative entrepreneurs can successfully develop new products at low costs.

2.1 Introduction

This article provides an overview of state programs designed to promote innovation—especially to those targeted at growing innovative firms throughout the United States. Since poor performance of the markets is one of the major justifications for government actions in the marketplaces for new products, these programs will be reviewed from the standpoint of whether and how much they enhance the working of the markets – i.e., by reducing the transaction costs and in increasing the supply of resources for new product developments. The arguments are that governments can best promote business growth by improving the working of the output and resource markets so that entrepreneurs can exploit the market opportunities and that by investing in the resource markets to increase the supply of resources, innovative entrepreneurs can successfully develop new products at low costs.

A framework depicting a system of interconnected markets (for production resources) in developing new products is introduced. This provides a framework for

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analyzing factors affecting the operation and growth of new product markets. This framework also suggests ways government actions can influence these factors by improving efficient operation of these markets leading to new product development. State programs in each of these markets were reviewed and summarized in Exhibits A through D (with discussions of some individual programs in Appendix 1). These programs are grouped into four categories – (1) direct participation in the markets by state government(s) state participation as the supplier or as the buyer, (2) state activities to improve the working of the markets by changing the culture/mindset of the participants in the markets, (3) investment in the market infrastructures to improve the supply and/or to reduce the transaction costs in the market, and (4) direct state assistance to entrepreneurs as the buyers (for inputs) and the sellers (of products). Finally, the paper concludes with a brief discussion on the effectiveness of state programs in promoting innovation and the formation and the growth of innovative firms.

2.2 A Multiple Market Ecosystem for Developing New Products in a Market Economy

I. Chart 2.1 depicts a framework for a complex system of marketplaces usually accessed by entrepreneurs in developing new products. This framework include:

- A system of interlinked marketplaces for products and production resources (of workers, talents, research activities, capital, etc). These markets differ in their level of market development (i.e., in the breath and efficiency in promoting exchanges) and many smaller segmented markets are characterized by high information and transaction costs.
- The important role of entrepreneurs in this ecosystem – in developing new products by participating in the output and resource markets. They are the *catalysts* in organizing economic resources to produce new products, the *creators* of production capacity, the *risk-taking investors* who develop new products and/or find better solutions in uncertain markets, and the *enterprise builders*.
- Moreover, there are sub-markets within each major resource markets. For example, the markets for skilled workers are found in widely dispersed geographic locations linked by state and local employment networks and affected by skilled worker mobility. Chart. 2.2 provides a simplified description the market for credit and capital in the U.S.¹ The breath and the efficiency of each submarket differs significantly: submarkets range from a very limited and segmented ones for individual investors/lenders and the entrepreneurs,

¹ While money is known to be very fluid, savers, lenders', and borrowers' access to different capital markets may be hindered by various factors affecting the working of the markets.

to a nation-wide or even world-wide market for public securities. Public securities markets characterized by myriad rules, regulations, and business practices affecting the conduct and decision making for all players – e.g. the borrowers, brokers and dealers, the lenders such as businesses, individual lender/investors, and institutional lenders/investors.

- Key participants in the capital and credit market include:
 - *Suppliers/lenders/investors*: households as savers, businesses as savers and investors, governments as savers and investors, the rest of the world (ROW); financial institutions as intermediaries gathering savings from savers for lending/investing
 - *Buyers/borrowers*: households, businesses, and governments as the borrowers; financial institutions as the intermediaries in the borrowing and lending markets; and the ROW as the borrowers.
 - *Providers of support services*: brokers, dealers, financial intermediaries, service providers, etc.
 - *Government(s)* as the regulator of market activities as well as the contract enforcer

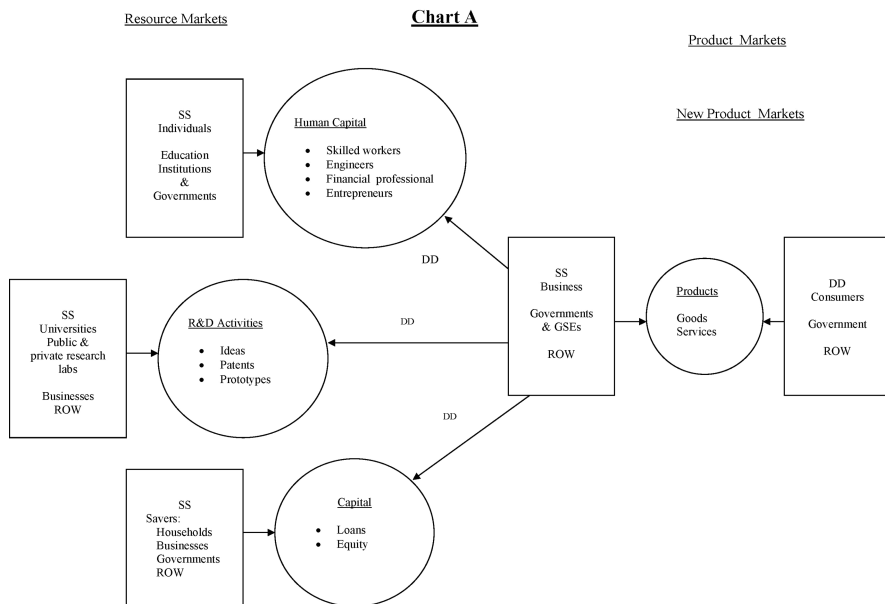


Chart 2.1 A multiple market ecosystem for developing new products

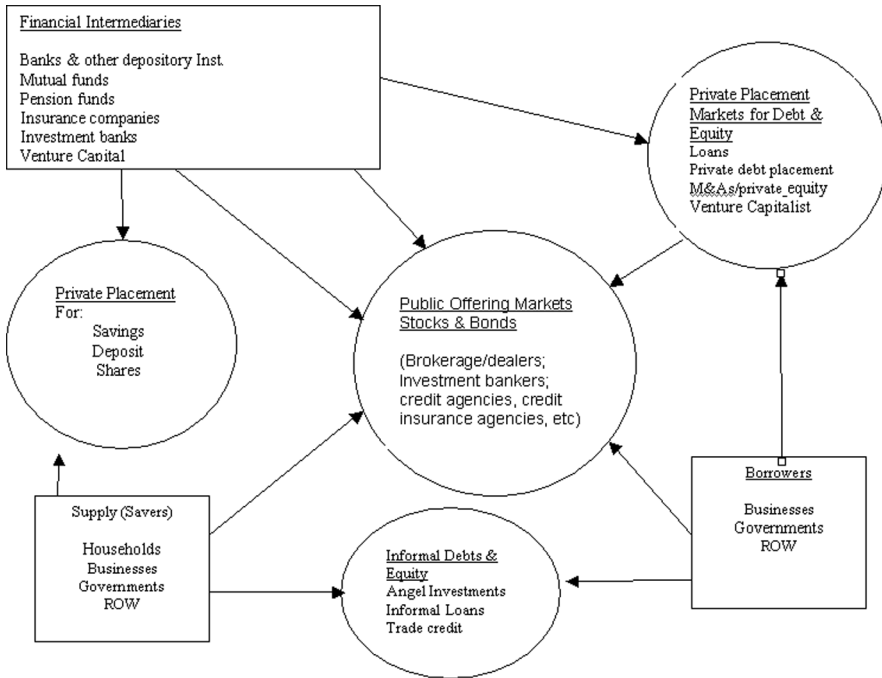


Chart 2.2 Credit and capital markets

2.3 Factors/Forces Affecting the Operation of a Marketplace and Thus the Formation and the Growth of Innovative Businesses (Businesses that Develop New Products)

In market economy, a market is an arrangement/mechanism that facilitates the exchange of resources between the owners and the users.² An efficient market allows the buyers and the sellers to complete the exchange transactions a market-clearing price— a price high enough to encourage continued business investments overtime to produce more and better products. Many structural, institutional, and behavioral factors influence the efficient operation of a market. These factors include:

- *Culture/mindset/social networks*: Values, preferences, and attitudes toward business activities, profits or other monetary gains, risk taking of the market participants (the buyers, the sellers, the service providers, including governments).

²The so-called “enabling environments” versus “barriers to entry” and “market impediments”, etc.

Importance of their mindsets in affecting their behaviors and decision making of the market place;

- *Market infrastructures-hardware*: Transportation facilities; physical capital structures/buildings, communication facilities; public utilities; research labs, etc;
- *Market infrastructures-software*: Laws, rules, and regulations; institutions and business organizations; customs and practices/administrative practices affect the transaction costs in the markets.³

These factors affect the decision making of the market participants (the buyers, the suppliers, and exchange facilitators) and thus the costs of exchange in the product and the resource markets, which, in turn, affect the costs of developing new products and the success of firm formation and the growth.

2.4 Poor Performance of New Product Markets – One Major Justification for State Governments’ Actions in New Product Markets

Special characteristics/elements of the market for new product development, Some of these special characteristics include:

- The product markets– the market is not well defined and constantly changing, (the demand and supply are vague; with high startup costs and a long investment-to-profit cycle;) and the successful introduction of new products is characterized by high failure rates and huge returns on investment (ROI) but only for a small number of successful ventures;
- The resource markets – small and/or not developed because of small demand and non-market-oriented – e.g. nonprofit oriented research & development (R&D) in universities and government labs; small capital markets to fund and commercialize R&D products; undeveloped support service sectors-deal facilitators, other professional services.

These market imperfections resulted in the poor market performance in developing new products. Complaints about slow growth and/or inadequate supply at high production costs in the forms of financing gap, innovation gap (or the R&D gap),

³Examples – programs and networks to facilitate R&D collaboration between business and R&D institutions such as government and universities; programs and centers providing training and advice to entrepreneurs, venture investors, engineers and researchers; Laws, regulations and administrative practices that affect market exchanges, business startups and growth; court and legal framework that affect enforcement of contracts and settlement of business disputes, etc. See also, the World Bank, “DoingBusiness 2008”, Heritage Foundation, “2008 Index of Economic Freedom”, 2008

and of skilled worker gap are aired constantly in the presses in the United States.⁴ Examples:

- Gaps in the market for qualified workers, engineers, researchers, innovative -entrepreneurs, and business development professionals;
- Gaps in the markets for R&D activities – market-focused concepts, prototypes, solutions, products;
- Gaps in capital/credit markets for entrepreneurs, especially for equity capital to innovative startups.

2.5 State Programs to Promote Innovation and the Growth of Innovative Firms in the United States

State governments in the United States have been actively involved in promoting state and regional development since late 1970s when a stagnant national economy was hampered by high energy costs and rapidly rising inflation. Since late 1980s, promoting entrepreneurship and innovation became a development priority since late 1980s as state development officers switched promotion strategies from attracting big-box companies to promoting development and the growth of local entrepreneurs.⁵

Actions taken range from direct participation by state governments in the market place, e.g. as the direct suppliers, to investment in market infrastructures to improve market operation. Approaches to promote innovation and innovative entrepreneurship can be categorized as follows:

- *Direct participation in the markets by the government(s) as the buyer(s) or supplier(s):*
 - Supplement and/or replace the market operation, such as: buying R&D products from businesses; generating R&D outputs from government labs (for use by entrepreneurs); creating national universities or technical schools for more engineer graduates; etc.
- *Improve the working of the markets:*
 - Change/transform the culture and mindset of the market participants including community leaders and policy makers to change the altitudes, behaviors, decision making and national priority
 - Change/reform the software infrastructure of the market – rules and regulation, business and administrative practices, and taxations of business transactions

⁴See, for example, ASTRA (2007).

⁵The debate continued. See “Southern States to Ply the Art of the Deal” Federal Reserve Bank of Atlanta, EconSouth 10(1):Q1, 2008.

and/or business income, etc. Reduce the costs of transactions in the relevant markets through better regulations, better incentive/motivation programs, effective networks, etc.

- Promote investment in market infrastructure directly or indirectly: Examples;
 - invest in physical facilities in the markets
 - invest in technology, networks, programs, information collection to facilitate the efficient operation of the markets
 - invest to increase the availability and the quality of resources (skills, talent, knowledge, capital, etc.)
 - collect and disseminate information to market participants at low costs;
 - Increase/improve skills/knowledge of market participants (the buyers, the sellers, and support service providers.)
- *Direct assistance* to businesses to promote development of market-focused outputs
 - Public funding/subsidies to businesses to lower the costs of products;
 - Assistance to access the markets (for resources as the buyers) and in output markets (as the sellers).

Exhibits A through D provide a summary of major actions by the state governments in the three major resource markets and in new product market participated by entrepreneurs.⁶ Discussion of individual programs in some states are provided in the Appendix 1. Summary tables for state programs in promoting bioscience from the report on “Technology, Talent and Capital: State Bioscience Initiatives 2008” appeared in Appendix 2.⁷

Exhibit A: Policy action to improve the markets for human capital: A summary

Outputs

- Workers/talents with skills demanded in the markets. Graduates with specialized skills or professional training – skilled workers, engineers, researchers/scientists. Entrepreneurs, and venture investment professionals, including angel investors;

Problems: “Public good” nature of the output; supply not market focused

Goals: Ample supply at “reasonable” costs to the entrepreneurs

Policy actions: Improve the working of the markets through public and private investment and other public initiatives to facilitate education of workers/talents demanded in the markets

⁶See reports by National Governors Association (NGA), Council on Competitiveness, Kauffman foundation, Office of Advocacy (of SBA), World Bank, etc. as listed in the References.

⁷Battelle Technology Partnership Practice (June 2008)

Examples:

- Transform culture/mindset of the market participants
 - Create an education compact of government officials, community leaders, and business leaders;
 - Change public and student mindsets about SMET (science, math, engineering, and technology);
 - Formulate an education strategy to grow the supply of skills/talents demanded by entrepreneurs;
 - Formulate priorities, initiate, coordinate and promote market focused education programs;
 - Create market/demand sensitive public and private school systems;
 - Introduce incentive/motivations into the education system;
- Improve and invest in education infrastructure – hardware and software:
 - Colleges and universities, programs in SMET, programs for entrepreneurs or scientist/entrepreneurs, etc;
 - Networks, education exchanges, job centers;
 - Financial assistance/incentives to schools and to students in SMET areas;
 - Invest in educational & training programs-increase the supply of educators, SMET programs, scientist-entrepreneur programs, entrepreneurship programs, programs for venture investors;
- Other measures affecting the working of the labor markets:
 - Reducing the employment-related costs – payroll taxes, health insurance costs, pension benefit costs;
 - Immigration system conducive to international flows of knowledge/talent;
- Direct assistance to entrepreneurs as employers in the market:
 - Tax credit to lower the costs of employment;
 - Employee training credits;

**Exhibit B: Policy actions to improve the markets for R&D activities:
a summary**

Outputs: knowledge, ideas, solutions, patents, and prototypes.

Problems: Again, public good nature of the output supplied mostly by not-for-profit institutions. Supply not market focused.

Goals: Ample supply of R&D outputs at “reasonable” costs to the entrepreneurs.

Policy actions: To improve the working of the markets to facilitate market-oriented/focused R&D outputs.

Example:

- Direct participation as the providers of R&D
- Transform the mindset/culture in the R&D activity markets – public research labs, educational and non-profit research centers, private researchers, etc. – A public compact on R&D activities – to create a mindset in community leaders/public officers; public private collaboration
- Improve and invest in the market infrastructure:
 - Introduce incentives/motivation for R&D institutions to encourage market focused R&D in research institutions;
 - An environment that facilitates the exchanges of intellectual property – protection of property rights (patent, royalty, etc); technology transfer mechanisms from public institutions to private users;
 - Effective networks and collaboration arrangements for all market participants to create and exchange market-oriented R&D activities;
 - Invest in R&D infrastructure; research labs in federal and state government and universities;
 - Promote public-private research collaboration;
 - Establish innovation centers, manufacturing technology centers, incubators, etc.;
 - Invest in education and training programs for professional service providers to facilitate commercialization of R&Ds by public institutions. Invest in infrastructure.
- Direct assistance to entrepreneurs as the buyers of R&D outputs from Federal labs:
 - R&D tax credits;
 - Provide funding to entrepreneurs to commercialize government R&D products.

Exhibit C: Policy actions to improve the markets for equity capital for innovative firms: A summary

Outputs: Equity capital from external sources invested in innovative firms.

Problems: Inadequate supply of seed capital because of small segmented private-placement markets participated by risk averse investors.

Goals: Adequate supply capital at “reasonable” costs to the entrepreneurs.

Policy actions:

Example:

- Government(s) as the provider(s) of funds directly or indirectly to businesses with or without subsidies. See also below for arrangements involving leveraging of public money for private funds.

- Change/transform the culture, mindset, etc., about investing in innovative businesses – risk taking behaviors of institutional investors and individual investors;
- Improve the working of equity capital markets (through public investment and other initiatives);
- *Regulation and deregulation in the equity capital markets*
 - Regulation of investors;
 - Regulation of business firms;
 - Regulation of Intermediaries, e.g., brokers, dealers, agents, etc.
- *Regulation and deregulation of financial institutions, especially the depository institutions*: Promote competition in small business loan markets;
- *Investment in development of intermediaries and networks*: Brokers/dealers/agents and other professionals; institutional investors versus individual investors; “angel investment networks”; other physical and virtual networks for entrepreneurs and angels;
- *Investment in infrastructure*: Physical and virtual networks; telecommunication centers; educational/training facilities for entrepreneurs/investors/deal facilitators; IT technology; credit information collection and dissemination, financial modeling;
- *Maintain and increase competition in the markets*: Promote low cost access to the markets by all participants and lower information costs;
- *Reduce taxes on business income, investment gains, and other business taxes*: Tax credits (investment tax credits, R&D tax credits, etc.); taxes on capital gains;
- *Information infrastructure*: Collecting and disseminating credit information about market participants and information on market transactions to reduce the costs of information and due diligence;
- *Other public actions to facilitate commercialization of R&D*
 - Examples: state-wide business plan contests, government and media promotion of innovation activities, programs to promote tech transfers, etc.
- Public funding to increase the availability of equity capital;
- *Direct public investment*: Direct funding to innovative firms (SBIR, R&D grants/contracts, direct investment by a public investment board/fund);
- *Public/private partnership*: Leveraging of private resources (money, expertise, and experience): public investment funds managed by private venture capital companies (VC firms); public-private development fund, etc.; Funding to promote collaboration in public-private R&D organizations; Tech transfer promotion – facilitate commercialization of public R&D by entrepreneurs;
- *Tax expenditures to encourage private investments in innovative firms and/or to increase business profits*
 - Tax credits to investors and/or innovative firms: Investment Tax Credits (ITC), angel investment tax credit; R&D tax credit; CAPCOs, etc;
 - Tax abatement to investors and/or firms-for business income, investment gains, sales tax, and business properties.

- *Direct assistance to business as a borrower in the capital markets:* education of informed borrowers; assistance in locating financial resources; cut corporate income taxes;

Note: Improving the working of all resource markets will help reduce the financing needs for seed capital by reducing overall costs of innovation. Actions in the capital market will reduce the transaction costs of obtaining financing by reducing the financing related costs such as costs of due diligence, search costs, costs of information, costs of intermediation, and costs of contract enforcement.

Exhibit D: Policy action to improve the product markets: A summary

Outputs: New products introduced to the markets by entrepreneurs.

Problems: uncertain markets; market entry barriers; product liability, intellectual property protection against unfair and illegal competition; etc.

Goals: to successfully introduce new products to markets at home and abroad.

Policy actions: Improve the working of the markets through public and private investment and other public initiatives to facilitate successful introduction of new products.

Examples:

- *Government as the buyer(s)* –as the buyer(s) of the new products;
- *Transform culture/mindset of the market participants:*
 - Promote risk taking in new product innovation;
 - Change government and public mindsets about free trade, etc. the economic role of entrepreneurship, business profits, open and free markets in promoting economic growth;
 - Formulate priorities, initiate, coordinate, and promote market focused education programs;
- *Improve and invest in market infrastructure (hardware and software):*
 - Promote competition and free/open exchange/trade in the markets;
 - Eliminate barrier to entry to the markets;
Export zone – cutting the costs of exporting;
 - Reduce regulation on new product introduction;
 - Promote new forms of business organizations, e.g. limited liability corporation (LLC), etc.;
 - Reduce the costs of product liability litigation; etc;
 - Provide networks to facilitate exchange of information and business advices;
 - Invest in educational & training programs to improve management efficiency of new entrepreneurial firms;
 - Reduce the costs of doing business – e.g. costs of litigation, contract enforcements, product liability;
 - Reduce taxes on business assets and on profits;

- *Direct assistance to innovative entrepreneurs*
 - Marketing assistance – promoting products abroad (foreign market exhibition);
 - Assistance to promote access to resource markets.

2.6 On the Effectiveness of State Programs in Providing Assistance to Innovative Firms: Brief Remarks

A perennial issue in the discussion and evaluation of government programs is related to the relative efficiency or inefficiency of a government program in allocating limited public resources to different projects, localities, industries, and firms.

- A. A state-guided investment program has been subjected to several criticisms – namely, they are usually misguided by past success; characterized by excessive investment; picking the wrong winners and losers; difficulties in evaluating program performance because of multiple and sometimes conflicting objectives; and the difficulty in changing directions (i.e. difficulty to cut losses because of built-up vested interest groups, saving face.) Moreover, the moral hazard issue is always present when the program manager(s) manages other people's money.⁸
- B. An allocation mechanism that relies on the market process – the price mechanism and profit motivation, is usually brought up as an alternative model in the discussion. Philip Cooke of England emphasized the efficiency of the private investment dictated model in financing successful innovations in the U.S., especially the success in Silicon Valley, when he compared the ineffectiveness of Europe's regional innovation system (RIS) with new economy innovation system (NEIS).⁹ He concluded that "Europe's innovation gap with the United States rested on excessive reliance on public innovation. . . "
- C. The relative role of government in innovation in a market economy depends on the relative development of the output and the resource markets – the efficient operation of these markets in facilitating the exchanges of resources at low transaction costs. The highly developed resources and output markets for new electronic products in Silicon Valley enable efficient investment by private venture investors – allocating limited investment funds to successful innovation. However, the costs of inefficiency from wrong investments during a cyclical peak, 2000, should remind us of the volatility of investing in new product markets. In many R&D markets where the markets are less developed and information and transaction costs are very high, the important role of

⁸Baumol et al. (2008)

⁹Philip Cooke, "Regional Innovations, Clusters, and the Knowledge Economy", University of Wales, UK

government – as the demonstrator for pilot projects in the early stage of learning cycle; as the risk takers intended to capture external benefit of new discoveries, etc., cannot be denied. By working to improve the functioning of the markets and by relying more on the market process to administer government assistance programs, government programs can contribute significantly to the success of innovation

- D. It is therefore inevitable that there are as many proponents of government programs as there are opponents. In many occasions, programs enacted with enthusiastic support from both executive office and the state legislators, were abandoned after critical evaluation by State's auditors.¹⁰

2.7 Conclusion

Performance of many state programs to promote the growth of innovative firms has improved overtime as state development officers continued to learn from their owned experience and from their fellow development officers in other states. A review of state programs to promote the growth of innovative entrepreneurs during the past decade identified the following emphasis that contributed to the improved performance in these programs.

- *Public-private partnerships*
 - Collaboration between research organizations and businesses/entrepreneurs – to promote market-oriented R&D;
- *Networks (of information, participants, expertise)*
 - To facilitate the exchange of R&D knowledge, market information, services, etc., (lowering transaction costs);
- *Incubators as one effective instrument*
 - Providing coordinated assistance (both financial and technical);
- *Emphasize building the capacity to supply in the markets* – capacity to conduct R&D activities, to educate and train talent (in innovation, entrepreneurship, etc.), and to invest, etc.;

¹⁰A typical example of the criticism of the business support programs in the U.K. is provided in the “The Richard Report on Small business and Government.” The report concluded .. the programs .. “A system which is overly complex, ineffective and undirected. Some 3000 business support schemes are being run by over 2000 public bodies and their direct contractors at a direct costs of at least 2.5 billion pounds. . . for example, at least a third of the money spent on regional schemes is lost in administrative costs” “Equally, little is known about the effectiveness of existing programs.” –lack of evidence about the effectiveness of the programs and interventions. Not analytical measurements of effectiveness

- *Cluster* as a regional economic development strategy;
- *Reliance on market process* in the allocation of resources to selected firms;
- *Importance of information collection* for program design as well as in monitoring, auditing, and evaluating program performance.

The importance of a comprehensive database on market activities cannot be overemphasized. Information about the market operation and the market outcome – i.e. the demand, the supply, and the costs and the price of the products and resources are the basis to formulate effective assistance programs. It also provides the only assurance for effective monitoring of the performance of government programs.

Appendix 1

Case studies of state programs to promote innovation and the growth innovative firms in the United States.

Example: Higher Education Compact for STEM Graduates (CA)

- A public-private compact of stakeholders of private sector, postsecondary education institutions, and government and community leaders;
- Goals/targets – to double the number of credentialed math and science teachers (750 to 1,500), etc.;
- The process –
 - Identify the business needs* – the specific needs in the economy for postsecondary graduates;
 - Periodic policy audits* to understand how state rules and regulations effect postsecondary performance;
 - Agree on the mission, priorities, and key outputs of the overall postsecondary system*, including production of STEM teachers and critical occupations, and acceleration of innovation;
 - Share the responsibility for the success* – outlining state government commitment to provide clear direction to postsecondary education; align and stabilize budgets and adequately fund compact efforts over the long term; and reduce the bureaucratic and regulatory burden to allow postsecondary education to be more flexible;
 - Establish mutual accountability systems to enforce the compact* that includes tools such as: transparency; reward-linked funding, and deregulation; and sanctions for noncompliance;
 - Underpin accountability system with robust longitudinal data systems* with performance tied to the above enforcement tools.

Source: National Innovation Initiatives' "National Innovative Agenda" for Federal and state programs.

Example: "Creating an education system for an entrepreneurial economy in Kentucky"

New objectives of the system:

- *Changing culture:*
 - From one that develops employment skills to one that develops necessary skills to build new businesses,
- *Creating entrepreneurship atmosphere:*
 - Throughout education system for k-12 through post-secondary institutions, and
- *Developing students' knowledge/skills:*
 - deploy technology resources in high-growth businesses.

Investment to promote innovation by State governments – a sample of cases

Michigan – Michigan's 21st Century Jobs Fund, (funded in 2006 with \$400 million; \$75 million per year) Situated within Michigan's Economic Development Corp., the Fund has an applied research focus in five areas – life sciences; alternative energy; advanced automotive; manufacturing and materials; and homeland security and defense.

Minnesota – In 2003 – the Initiative on Renewable Energy and the Environment at the University of Minnesota. The goal – by 2025, that the state should get 25 percent of its power from renewable sources. The initiative invested nearly \$19 million in more than 110 research and demonstration projects; leveraged some \$12 million in matching funds, including some from business and industry; and collaborated on research with upwards of 40 business and industry partners.

Georgia – Putting all the pieces together includes building expertise in appropriate technologies and orchestrating collaboration among key partners. The Georgia Research Alliance (GRA) provides funding to recruit "eminent scholars" to Georgia universities. To date, 54 scholars have been recruited. The GRA also funds "Venture Lab" fellows – experienced entrepreneurs who work with faculty members and others to evaluate research and build companies that meet a demonstrated commercial need.

Ohio – The state in 2003 launched its 10-year, \$1.6 billion "Third Frontier" initiative establishing the Wright Centers of Innovation in biosciences and engineering. Run through the Third Frontier Commission, the state has also spent more than \$50 million to develop a fuel-cell industry and more than \$100 million for the Biomedical

Research and Commercialization program, and awarded \$60 million to create a Global Cardiovascular Innovation Center at the world-renowned Cleveland Clinic Foundation.

Maryland – The Maryland Industrial Partnerships (MIPS) Program is a project of the Maryland Technology Enterprise Institute to jointly fund technology-based research and development between Maryland industries and University of Maryland researchers. Since 1987, the state has contributed \$27.8 million and industry \$115.6 million.

Source: NGA Center for Best Practices, “Innovation America: A Final Report – Enhancing Competitiveness: A Review of Recent State Economic Development Initiatives” National Governors Association (NGA)

Example: establishment of State Development Board/Corporation

Mission: to develop programs to promote innovation, entrepreneurship, and economic development in the states

Program components an investment fund; funding authority to increase R&D capacity in the state and to establish/support incubators, etc.

Investment fund(s)

Investment through venture and/or seed venture funds for innovative startups in the state

Incubators/innovation centers at state’s research universities

Example: The Biotechnology Investment Incentive Tax Credit (Maryland)

Goals: to help fund seed and early-stage biotech and bioscience companies by providing an incentive for investors- a refundable tax credit equal to one-half of initial investment.

Qualified company: biotechnology company based in Maryland with fewer than 50 full-time employees, in business no longer than 10 years, and certified by the Department of Business and Economic Development (DBED).

Qualified investor: an investor who invests at least \$25,000 or a corporation that invests at least \$250,000 in a qualified company."

The credit available to investors: 50 percent of an eligible investment made during the taxable year. There is a cap (\$50,000 for individual investors or \$250,000 for corporations and venture capital firms.) The amount of credits granted during the tax year also cannot exceed the amount funded.

Investment period: hold on to the investment for at least two years after getting the credit approved.

Other Examples:

- 2008 Kansas Angel Investor Tax Credit Program
- Ohio TechAngel Fund LLC – Fund I and Fund-II,

Example: ATDC: Helping Georgia Entrepreneurs Build Great Technology Companies

Advanced Technology Development Center: a tech incubator based at Georgia Technology University

- *Missions:* Stimulate economic growth through technology sector
- *Services offered:* Strategic business advices, networks of people and resources, entrepreneurial learning community, and turnkey facilities and services
- *Programs include:* Entrepreneur Resource Center, Venture@Lab, ATDC Seed Capital Fund, and Innovation Centers;
- *Technology emphasis* – Internet technology, telecommunications, and bioscience;

Source: Office of Advocacy, “Putting It Together: the role of entrepreneurship in economic Development”, conference Proceedings, March 2005.

Example: Maryland’s TEDCO (Technology Development Corporation): An evaluation

- *Objective:* business incubation to encourage, promote, stimulate, and support research and development (R&D) activity through the use of different investments leading to commercialization of new products and services by small businesses.
- 18 centers in existence; 4 new proposed centers
- Most helpful in providing inexpensive work space – office and lab space;
- Other helps from the centers–
- Reason for the success: Industry clusters – Academic R&D; over \$2.4 billion; over 40 research centers (some nationally known Federal labs and major universities; over 5000 high-tech establishment employing almost 200,000
- Need for business accelerators to help the graduates to grow

Source: RTA International

Appendix 2

Sample tables on State programs summary to promote Bioscience in the United States– Tables 2.1, 2.2, 2.3, and 2.4 reprinted from: Battelle Technology Partnership Practice, “Technology, Talent and Capital: State Bioscience Initiatives 2008”

Table 2.1 Pre-commercialization/proof of concept funding in FY 2007 and FY 2008

State	Commercialization funds*	Maximum award	One-time funding	Annual funding	
AZ	Arizona Technology Enterprises (ASU), Univ. of Arizona Tech Transfer Office, Catapult Bio	\$50,000		\$250,000–\$300,000	\$2.5–3 million
CA	Entrepreneurial Joint Venture Matching Grant Program (CSUPERB)	\$25,000–\$30,000			
CO	Colorado Bioscience Discovery Evaluation Grant Program	\$150,000	\$2.5 million	\$2 million	
	Colorado Bioscience and Life Science Fund	\$250,000 for companies, \$15,000 for research institutions	\$26.5 million over 5 years		
CT	BioSeed Program	\$500,000	\$5 million		
DE	Technology Based Seed Funds	\$100,000		\$1 million	\$1 million
FL	State University Research Commercialization Assistance Grant Program		\$2 million		
GA	VentureLab	\$50,000 for Phase I; \$100,000 for Phase II; \$250,000 for Phase III		\$4 million	\$4 million
IL	Entrepreneur in Residence Program, PROPEL and iBIO Entrepreneurship Center; other Entrepreneurship Centers (12); Innovation Challenge Technical Assistance and Matching Grant Programs	Entrepreneur in Residence \$80,000 Entrepreneurship Centers: \$10,000 Innovation Challenge Grant Program: \$50,000		\$3.8 million	\$1.65 million
IA	Demonstration Fund	\$150,000		\$2.5 million	\$2.5 million
KS	Bioscience Innovation and Matching Fund	\$2 million		\$5.5 million	\$8 million

Table 2.1 (continued)

State	Commercialization funds*	Maximum award	One-time funding	Annual funding	
	KTEC Proof of Concept Fund				
KY	ICC Concept Pool	\$25,000		\$2.7 million	\$2.5 million
ME	Maine Technology institute Development Awards, Seed Grants, SBIR Phase 0, Cluster Enhancement Grants	\$500,000		\$6.3 million	\$8.5 million
MD	University Technology Development Fund	\$50,000		\$450,000	\$400,000
MA	MTC/JAII Centers of Excellence Program, Matching Fund Programs, Innovation Fund Programs, Mass Tech Transfer Center Technology Commercialization Programs	Varies by program	\$50 million		
MI	21st Century Jobs Fund Michigan Pre-Seed Capital Fund			\$15 million	\$9 million
MS	Mississippi Seed Fund	\$15,000	\$4 million		
MO	Missouri Life Sciences Trust Fund, Missouri Technology Incentive Program	No maximum			\$2.6 million
		Phase I—\$5,000			\$1.25 million
		Phase II—\$50,000			
MT	Montana Board of Research and Commercialization Technology	\$500,000		\$3.5 million	\$3.5 million
NJ	Edison Innovation R&D Fund	\$600,000		\$5 million	\$5 million
NY	NYSTAR Technology Transfer Incentive Program	\$500,000		\$4 million	\$3.9 million
NC	North Carolina Economic Development Investment Fund (BIO only)	\$250,000		\$1 million	\$1 million

Table 2.1 (continued)

State	Commercialization funds*	Maximum award	One-time funding	Annual funding	
OH	Entrepreneurial Signature Program	\$100,000	\$84.4 million		
OK	Oklahoma Applied Research Support Program	\$45,000/year for up to three years		\$1.6 million	\$1.14 million
OR	University Venture Development Fund	NA		\$7 million	\$7 million
PA	Life Sciences Greenhouse		\$100 million	\$12 million	\$15 million
PR	PRIDCO-SBTR-Tied Grants	\$375,000		\$400,000	\$400,000
RI	Slater Technology Fund			\$3 million	\$3 million
SD	Part of 2010 Initiative	\$1 million		\$3.8 million	\$5.7 million
TX	Texas Emerging Technology Fund	\$3 million	\$25 million	\$12.5 million	\$12.5 million
VA	Commonwealth Technology Research Fund (CTRF)	No maximum		\$2 million	\$1 million
WA	UW Technology Gap Investment Fund and WSU Cougar Gap Fund	\$50,000		<\$1 million	<\$1 million
WV	Small Business Innovation Research (SBIR) Program			\$100,000	\$100,000
WI	Innovation and Economic Development Research Program	\$50,000		\$600,000	\$600,000

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Table 2.2 State-supported pre-seed Fund

State	Pre-seed funds	Total size of fund	Typical size of investment
CO	Colorado Fund I	\$40 million	\$500,000–\$1 million
CT	Eli Whitney Fund	\$45 million (approximately)	\$500–\$1 million
DE	Tech-Bbased Seed Fund I, Tech Based Seed Fund II, Pre-Venture Funding, Delaware Strategic Fund	\$32.5 total all funds 2006–2008	\$50,000–\$100,000
FL	Florida Opportunity Fund	\$30 million	
GA	ATDC Fund	\$8 million	\$200,000–\$500,000
HI	Investment in multiple funds	\$50 million	\$200,000–\$500,000
IL	Illinois Department of Commerce and Economic Opportunity Indirect Equity Fund (Angel & Seed Fund); Illinois State Treasurer's Technology Development Bridge; Illinois VENTURES and LLC	\$3.44 million \$75 million \$40 million	\$500,000–\$1 million
IN	Indiana Seed Fund	\$6 million	\$100,000–\$200,000
KS	KTEC Equity Fund	\$1.5 million plus additional funding for proof of concept	\$200,000–\$500,000
KY	Commonwealth Seed Capital	\$21 million	\$200,000–\$500,000
LA	Investments in several funds	\$65 million	\$500,000–\$1 million
ME	Maine Technology Institute Accelerated Commercialization Fund; Small Enterprise Growth Fund	\$8 million	\$200,000–\$500,000
MD	Maryland Venture Fund; Challenge Investment Program/ TEDCO's MTTF Program	\$6 million \$5.5 million	\$50,000–\$100,000
MA	Massachusetts Technology Development Corp	NA	\$200,000–\$500,000
MI	21st Century Investment Fund and Venture Michigan Fund	\$109 million \$95 million	More than \$1 million
MS	Mississippi Seed Fund	\$4 million	\$50,000–\$100,000
MO	Missouri Venture Partners	\$15 million	Up to \$50,000
NM	Flywheel Gap Fund	\$2 million	\$50,000–\$100,000
	LANL Venture Acceleration Fund	\$600,000	
NY	NYSTAR's Small Business Technology Investment Fund	NA	NA
OH	Third Frontier Pre-Seed Fund Initiative	\$263 million	\$10,000–\$200,000
OK	OCAST Technology Business Finance Program, managed by i2E	\$1.15 million annually	\$100,000–\$200,000
PA	Life Sciences Greenhouses	\$100 million	\$200,000–\$500,000
PR	Bio Science Investment Fund	\$250 million	NA
RI	Slater Technology Fund	\$ 3million	\$50,000–\$100,000
TX	Emerging Technology Fund	\$200 million	\$500,000–\$1 million
VA	CIT GAP BioLife Fund	\$500,000	\$50,000–\$100,000

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Table 2.3 State seed capital tax credits

State	State tax credits provided to:			
	Angel investors	Bioscience angel investors	Investors in early-stage venture funds	Investors in bioscience early-stage venture funds
AZ	•	•		
HI	•			
IN	•			
IA	•		•	
KS	•	•		
KY	•		•	
LA	•			
ME	•		•	
MD	•	•		
MI	•			
MT	•		•	
NM	•			
NY	•			
NC	•	•	•	•
ND	•		•	
OH	•		•	
OK	•		•	
OR			•	
VA	•			
WI	•	•	•	•

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Table 2.4 State investments to increase the availability of locally managed, later-stage venture capital, 2006–2008

State	Invested in fund of funds	Invested in private VC firms	Invested in bioscience companies	Other
DE	•	•	•	
HI				Appropriated funds for contract with private nonprofit to provide funding for companies
IL	•	•	•	•
KS			•	
KY	•	•	•	
MA			•	Through Massachusetts Technology Development Corporation
MI	•			
MT	•			
NJ	•	•	•	

Table 2.4 (continued)

State	Invested in fund of funds	Invested in private VC firms	Invested in bioscience companies	Other
NM		•	•	
NC		•		
OH	•	•	•	
OK	•		•	
OR	•			
PA		•		
RI			•	
SD			•	Provides financing for feasibility studies in the form of a forgivable loan
VA			•	
WI		•	•	

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