Innovation & the Role of Public-private Partnerships in the Knowledge-based Economy

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Science Based Growth

• The New Economy
  – Not a conceptual fad, but a long-term productivity shift of major significance
  – Key feature: integration of advanced productivity enhancing technologies into processes of production and value creation
  – U.S. productivity growth reflects this:
    • +5%, average growth Q1 Q2 2002
    • +2.2% average annual growth since 1995
    • 2001 Report of Council of Economic Advisors
Fostering Science Based Growth

- Basic Research Underpins Science Based Growth
  - Basic research is key in supplying new ideas
  - Innovations can become products driving growth

- In the U.S., increased attention to partnerships & role of universities
- Elsewhere, (e.g. E.U.) reflected in increased commitments to R&D funding
- Genuine ambivalence in U.S. about the partnership organizations despite current practice & past success.
- Academy Study to Ease Ambivalence.
Academies’ Study of Public-private Partnerships

- **Program-based analysis of U.S. partnerships**
  - Committee led by Gordon Moore includes nationally recognized members from Academia, Industry, Venture Capitalists, Public Policy Experts
  - Focus on “best practice” to generate positive policy recommendations

- **Topics**
  - Drivers of cooperation among industry, government, and universities
  - Operational Assessments of Current Programs
  - Emerging Needs in Information Technology and Biotechnology
  - Changing Role of Government Laboratories, Universities, and other Research Organizations

- **Outputs**
  - Meetings, Workshops, and Conferences
  - 11 Major Reports
U.S. has long benefited from cooperation between government and private firms
- Muskets & Telegraph to Semiconductors and Computers
- “Government has played an important role in the technology development and transfer in almost every U.S. industry that has become competitive on a global scale”—Vernon Ruttan
Drivers of Partnerships

- **Micro level Incentives...**
  - Obstacles to investments needed to bring forward promising technologies
    - Given risks, do firms expect to capture enough payoff from their investment? The *Appropriability Problem*?
    - What is the nature of the good--High Spillover?
    - What are the obstacles to knowledge coordination?
    - Is it difficult to assign and enforce intellectual property protection?
Drivers of Partnerships

...And Macro Outcomes
- By helping firms to overcome various barriers to investment, public-private partnerships can contribute to the development of industrial processes, products, and services that might not otherwise emerge spontaneously.
- In this way, public-private partnership help address government missions and generate greater public welfare.
Varieties of Partnerships

• Academy Study has focused on 3 types
  – Industry Consortia
  – Innovation Funding
  – Laboratory-based S&T Clusters

• Pragmatic Approach
  – Avoids ideological debates
  – Are partnerships shaped properly—at the program and aggregate levels—to achieve the desired benefits?
1. Industry Consortia

- In an R&D consortium, a certain portion and type of a participating company’s R&D is funneled into a separate organization where it is carried out collectively, and where research results are shared among member firms.
  - Useful in high spillover technologies
  - Government role
    - legally enable cooperation
    - Limited funding is key for catalytic effect
      - Limits on time & amount
  - Example: SEMATECH, ATP
2. Innovation Funding

- Awards help the early-stage funding requirements faced by firms in the innovation-to-market process.

- Imperfections in capital markets can sometimes pose major challenges to small firms trying to bring their innovations to market.
  - Small Business Innovation Research Program
    - Largest U.S. Partnership Program ($1.2 billion over 10 federal agencies)
  - Advanced Technology Program
    - Found to be one of the most effective major innovation funding partnerships today.
3. Laboratory-based S&T Clusters

- To promote innovation-led growth by encouraging knowledge-based clusters around the nucleus of national laboratories

Academy has studied
- Sandia S&T Park
- Ames-NASA S&T Park
Conditions for Successful Partnerships

- At the policy level
  - Federal government policies shape the larger environment in which innovation takes place
  - These relate to
    - Fiscal and Monetary Policy
    - Education and Training
    - Trade Promotion and Expansion
    - Regulatory Policy
    - Intellectual Property Protection
    - Government Procurement
At the Operational Level:
- Although partnerships vary in scale, mission, and scope, successful partnerships appear to share some similar broad characteristics:
  - Industry based Leadership
  - The relevance of Clear Goals, Metrics & Roadmaps
  - Shared Commitments & Costs
  - The importance of Regular Assessment
Industry Leadership

- **Industry-based leadership.**
  - Provides credibility & vital informal contacts.
  - Averts fragmentation over competing objectives.
  - Ensures that research agenda is valid and current.
  - Helps focus research by setting clear research objectives.
  - Willingness to change—Stop, Drop, and Recommit.
  - Can convey message of the partnership with one voice.
  - In the case of SEMATECH, the commitment of senior management of the participating firms was essential.
Technology Roadmaps set out the basic relationships among science, technology, and applications, as a point of reference among researchers, technologists, project managers, suppliers, and users.

- Complex technologies offer multiple research trajectories.
- Roadmaps anticipate problems of research coordination among multiple participants.
- Example: SIA technology roadmaps.
Shared Commitments and Costs

- Having a sizeable stake in the outcome of the partnership enhances the motivation of those involved to succeed.
- Limited and defined public participation.
  - Not open-ended.
- Helps terminate efforts that are not meeting objectives.
  - Markets are the ultimate arbiter.
  - Helps avoid “friends of the minister” problems.
- **Example:** matching requirement of ATP.
Assessment

- Ongoing assessment programs are an integral part of a well-constructed partnership.
- Need to clearly articulate goals & metrics of progress.
  - How do we know we are succeeding?
- Knowledge Generation: Need for institutional learning from evaluations.
- Example:
  - ATP incorporates a rigorous competitive selection process with an independent evaluation of the project’s technical and commercial merit, as well as the potential for broad-based economic benefits.
  - ATP awards are regularly followed and assessed.
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**Structuring Incentives Within the Context of a Partnership**
Main Lessons

- Properly constructed, operated, and evaluated, partnerships can provide an effective means of accelerating the progress of technology from the laboratory to the market.
  - They can play an instrumental role in accelerating the development of new technologies from idea to market.
  - They offer an institutional structure with financial and policy incentives within which firms, universities, and national laboratories can cooperate to advance the development of promising technologies.
  - Regular evaluations are essential for effective partnership.
  - Partnerships can contribute to the competitiveness of industry; however, partnerships are not a panacea.
International Benchmarking

- **In a Global Economy, What Others Do Matters**
  - It is important to:
    - Learn Scope and Focus of National Efforts
    - Learn Best Practice in Program Conception, Operation, and Evaluation
    - Seek Opportunities for Global Collaboration
Collaborative Conferences & Activities

- Institute of Enterprise and Innovation of the Nottingham University Business School: September 2000
- Otaniemi International Innovation Centre and the Helsinki University of Technology (HUT): September 2000
- German Federal Ministry of Economics and Technology, Berlin: May 2001
- Hamburg Institute of International Economics (HWWA), May 2001
- Swedish Foundation for Small Business Research (FSSF): December 2001
- French National Academy of Technology, Paris: March 2002
- J·k·ing, International Business School and Vinnova, May 2002

And Upcoming...

- **Consejo Nacional de Ciencia y Tecnología (CONACyT), Mexico: December 2002**
- **Ministry of Industry, France: January 2003**
- **DIW, Berlin: June 2003**