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Addressing Challenges in the Measurement of Productivity and Innovation

Presented by:

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ITIF is public policy think tank committed to articulating and advancing a pro-productivity and pro-innovation policy agenda internationally, in Washington and in the states. ITIF focuses on:

- Innovation processes, policy and metrics
- Science policy related to economic growth
- Digital transformation (E-commerce, e-government, e-health, etc.)
- ICT and economic productivity
- Innovation and trade policy

"Trust us, money spent on science does more than employ scientists."

What FDR wanted when he tasked Vannevar Bush with producing a report on the organization of post-war research:

"the information, the techniques, and the research experience developed by the Office of Scientific Research and Development and by the thousands of scientists in the universities and in private industry, should be used in the days of peace ahead for the improvement of the national health, **the creation of new enterprises bringing new jobs, and the betterment of the national standard of living.**

"Trust us, money spent in science does more than employ scientists."

What he got:

"The most important ways in which the Government can promote industrial research are to increase the flow of new scientific knowledge through support of basic research, and to aid in the development of scientific talent."

"assuring complete independence and freedom for the nature, scope, and methodology of research carried on in the institutions receiving public funds"

"Continuity and stability of the program and its support may be expected (a) from the growing realization by the Congress of the benefits to the public from scientific research"

Vannevar Bush, "Science, The Endless Frontier," 1945.

Most data on the STEM enterprise is input or intermediate output data.

- Number of STEM workers
- Level of university research funding
- Number of journal articles

We really know very little.

- How many firms, jobs, sales and exports can be traced back to federal STEM support?
- Which universities and federal labs do the best job – controlling for size, etc – of creating firms, jobs sales, and exports?
- Where should the next dollar of federal R&D be invested to get the most firms, jobs, sales, and exports? (stage, discipline, institution, etc.)

We need better intermediate output data.

- How effective are recipients of federal research dollars in commercializing technology (new startups, patents, licenses; consortia agreements; sponsored research by industry)

- What disciplinary research areas have the biggest impact on economic indicators?

We need better final outcome data.

- Value of new products and services coming from government-funded research.

- Improvements in productivity coming from government-funded research.

- Number and quality of jobs directly and indirectly stemming from government funded research.

- Societal value from government funded research (diseases cured or prevented; carbon emissions reduced, etc.).

We need better understanding of sources of innovation-based entrepreneurship.

- Can we better classify entrepreneurial innovations ?
  - *Technology-based* (emerged because a new technology was developed that made the entrepreneurial innovation possible – e.g., cheap storage and broadband – YouTube)
  - *Design-based* (fractional ownership business model– NetJets;
  - *Demographics-Culture Change-based* (opportunities emerged as environment changes – e.g. growth of chain nursing homes).

We need better understanding of firm use of ICT

- Data on cap ex use, including ICT (hardware, software, and telecommunication services.

- Better data on e-commerce use.

We need better understanding of relationship between firm production and R&D

- R&D require the output from production – to generate knowledge outputs.

- Need to track progression of knowledge through research, engineering development and industrial production.

(Benoit Godin and Joseph P. Lane. "A century of talks on research: what happened to development and production?"

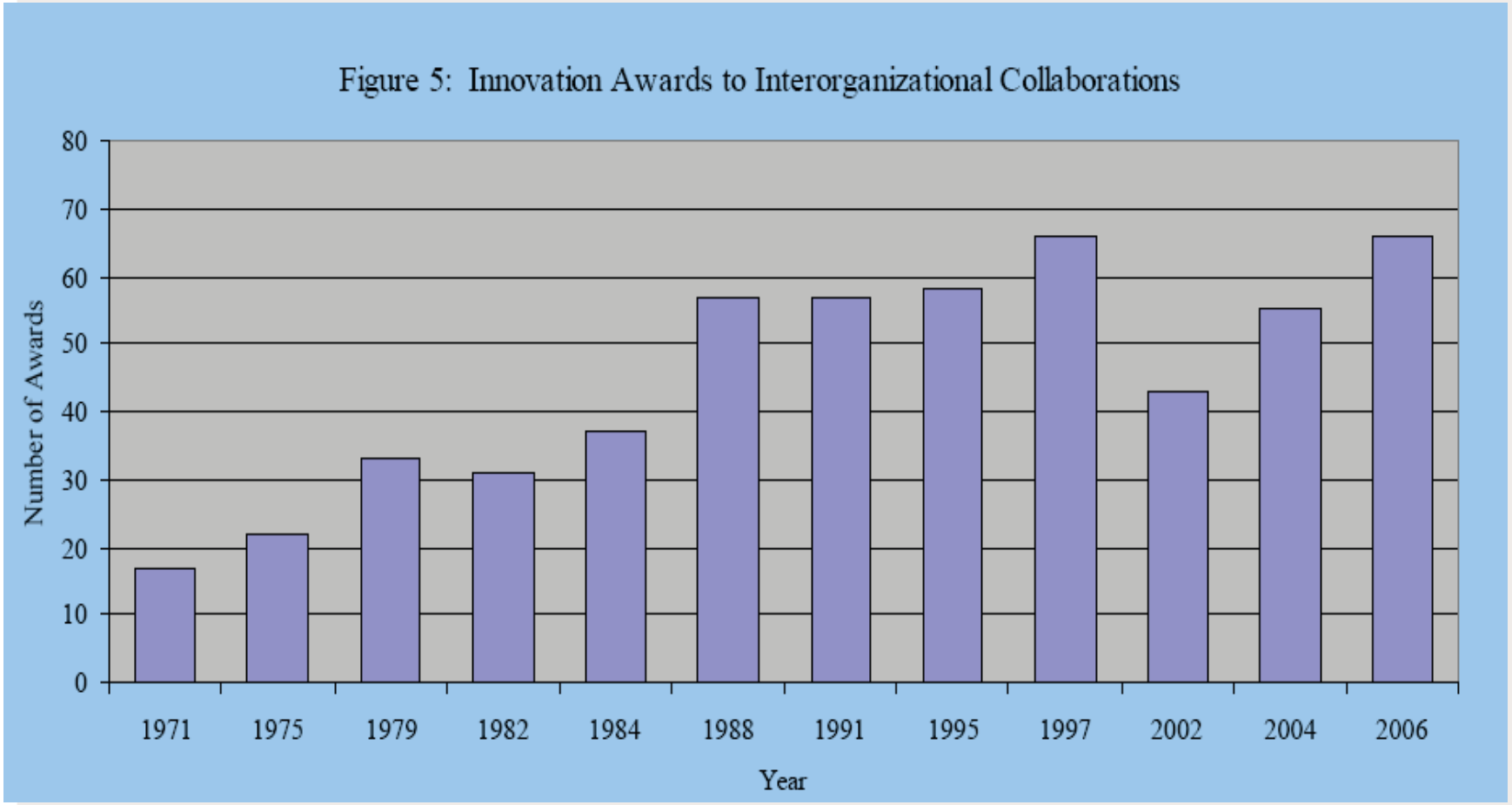
Can use backward, "forensic" analyses.

- NAS study on the origins in federal R&D of major IT innovations.

- Wellcome Trust study (Between 1965 and 1992, 15 of the top 21 grossing drugs were developed from federally-funded research, 7 of which were directly related to NIH.

- Breakthrough Institute analysis of federal R&D origins of natural gas exploration revolution.

Can use backward, "forensic" analyses.



- Fred Block and Michael Keller, "Where Do Innovations Come From? Transformations in the U.S. National Innovation System, 1970-2006, (ITIF, 2008).

Thank You

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