

# Developing a PPI for Scientific Research & Development NAICS 5417/ ISIC 7310

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**David Friedman**

Assistant Commissioner for Industrial Prices &  
Price Indexes

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# Presentation Overview

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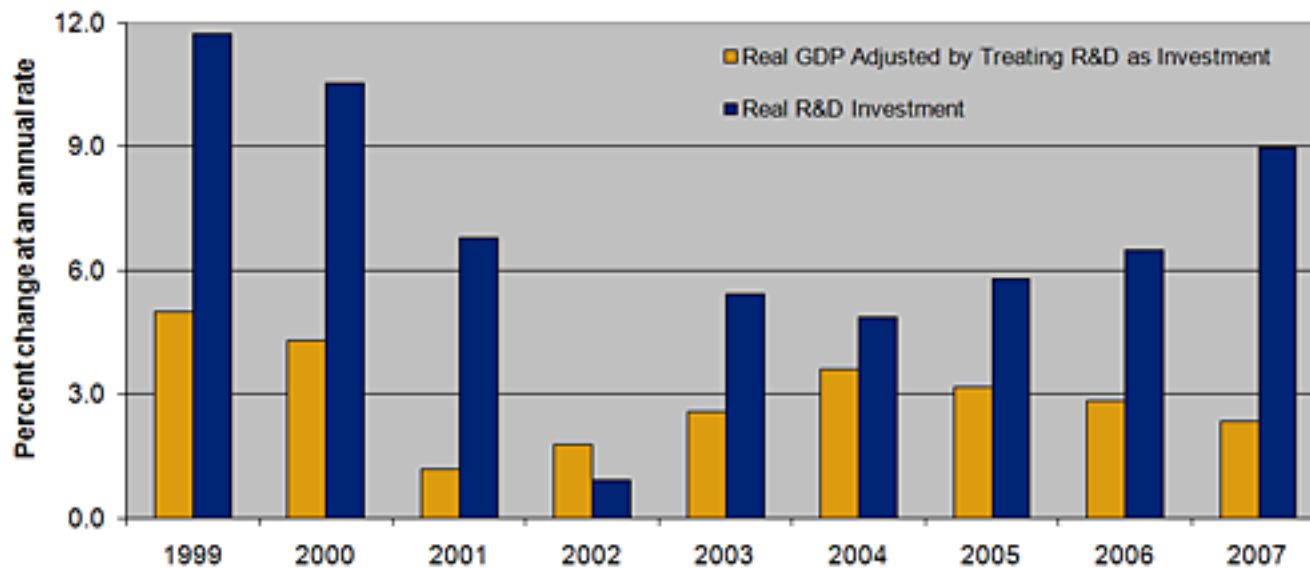
- Significance of R&D in US
- Issues related to constructing deflators
- Considerations in developing a USPPI for R&D
  - ▶ Industry Output Definition
  - ▶ Obtaining new transaction prices
  - ▶ Maintaining a constant quality index
  - ▶ Sampling
- Summary

# Significance of R&D in USA

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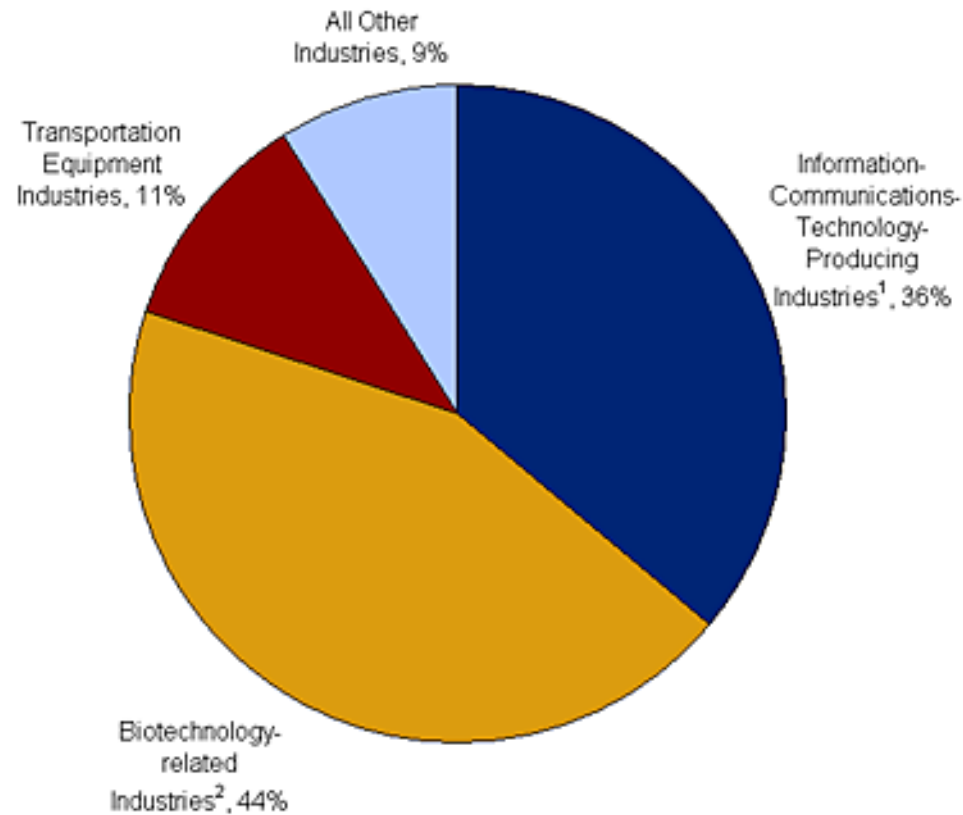
- NSF: R&D expenditures grew from \$288.3 billion in 2003 to \$397.6 billion in 2008
- BEA Satellite Account: treat R&D as investment
  - ▶ 6.3% of real GDP growth between 1998 and 2007
  - ▶ 6.6% between 2002 and 2007

# Real GDP vs. Real R&D Investment



U.S. Bureau of Economic Analysis

# Sources of Business R&D's Contribution to Real GDP Growth, 1998-2007



Source: Bureau of Economic Analysis

# Challenge: Constructing a Deflator

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- Ideal: a PPI that directly measures actual market transactions for R&D output
- BEA current proxies
  - ▶ Cost-based aggregate of indexes for inputs
  - ▶ Weighted combination of gross output prices of industries investing in R&D
  - ▶ Next best alternatives in lieu of actual R&D output prices

# Overall Issue: Feasibility

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- Is R&D output measurable for the purposes of a true price index?
  - ▶ Can we identify a *marketable* output?
  - ▶ Are transactions *recurring*?
- BEA has expressed interest in BLS developing PPI for business R&D output
- If funding became available, how would we approach development?

# Four Areas of Investigation

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- Industry output definition
- Obtaining net transaction prices
- Maintaining a constant quality index
- Sampling



# Industry Output Definition

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- Concentrate on business purchases of R&D
  - ▶ 34% of R&D expenditures for all for-profit industries in 2007
- Focus on NAICS 5417, Scientific R&D Services
  - ▶ I/O data indicates output is used by large portion of R&D intensive industries

Worldwide R&D employment intensity for activities in selected industries: 2008

Industry	Percent
All industries	7.1
Manufacturing industries	6.9
Pharmaceuticals/medicines	14.1
Computers/peripheral equipment	11.9
Communications equipment	26.7
Semiconductor/other electronic components	19.3
Navigational/measuring/electromedical/control instruments	10.2
Motor vehicles/trailers/parts	5.8
Aerospace products/parts	8.7
Nonmanufacturing industries	7.3
Software publishers	17.8
Computer systems design/related services	24.8
Scientific R&D services	30.7

NOTE: R&D employment intensity is R&D employment divided by total employment.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Business R&D and Innovation Survey: 2008

# Industry Output

## Definition: Questions

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- What is the actual service to be measured?
- Is it R&D for a specific product or improvement?
- Is it R&D for a general class of product?
- Is it R&D for a specific industry?
- Does the output consist of the research services provided, the sale of licensing rights or patents, or some combination of both?

# Net Transaction Prices

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- Challenge: Services tend to be unique and non-recurring
- Model pricing as potential solution
- Model pricing vs. margin prices as an alternative

# Net Transaction Prices: Questions

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- Is model pricing methodology appropriate?
- Does it matter if the R&D contract results in a patent or license?
- Appropriate to measure licenses and patents separate from the R&D contracts?
- Similar transaction occur often for sale to be repriceable for a monthly index?

# Constant Quality

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- Advantages of model pricing – allows service delivery process, type of buyer, & contract terms to be held constant
- Importance of directed substitution

# Sampling Considerations

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- Identification of an appropriate frame
  - ▶ Goes back to industry output definition
  - ▶ Issues with NAICS definition
- Treatment of own-account R&D
- Representative of industry size
  - ▶ 16,654 establishments classified in NAICS 5417 in 2007 Economic Census (preliminary)

# Sampling: Questions

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- Who provides R&D?
- Are they stand-alone companies?
- Are they subsidiaries or divisions of manufacturing companies who also invest in own-account R&D?
- Would revenue derived from own-account R&D be included when determining relative weight of each frame unit?



# Summary

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- BEA targets introduction of R&D as investment component in the GDP accounts in 2013
- Likely to continue to use proxies
- Better understand production transformation processes for R&D
- Would a PPI that BLS could develop be useful? How robust and flexible?
- What can be priced periodically and how best to ensure measures of pure price change are captured?

# Contact Information

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**David Friedman, Bonnie  
Murphy, Dee Bathgate**

Producer Price Index Program

[Friedman.David@bls.gov](mailto:Friedman.David@bls.gov)

[Murphy.Bonnie@bls.gov](mailto:Murphy.Bonnie@bls.gov)

[Bathgate.Deanna@bls.gov](mailto:Bathgate.Deanna@bls.gov)

THANK YOU FOR YOUR INPUT!

