Experimental Industry Estimates in BEA’s R&D Satellite Account

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New in the 2007 Release

- Building on 2006 SA, includes several enhancements:
  - Improved measures of prices for R&D.
  - Adjusts R&D investment for international trade in R&D services.
  - Adjusts for the double-count with previously capitalized R&D in software investment.
  - Includes a preliminary estimate of R&D investment in social sciences based on Economic Census data.
New in the 2007 Release (cont’d)

  - Impact of R&D as investment on gross output and value added for R&D-intensive industries.
- First look how the international and regional accounts would implement the capitalization of R&D.
Industry Detail: R&D Intensive Industries

Manufacturing Detail:
- Chemical excluding Pharmaceutical
- Pharmaceutical and medicine
- Computer & electronic products
- Communications equipment
- Semiconductors
- Navigational/measuring/medical/control instruments
- Motor vehicles, trailers and parts
- Aerospace and other transportation equipment

Services Detail:
- Software publishing
- Computer systems design and related services
- Scientific R&D services
Industry Impacts

- Impacts industry gross output and value added.
- Business investment in R&D by industry split:
  - Own account
  - Purchased R&D
- Purchased R&D adjusted from a cost basis to an imputed purchase price basis.
- Purchases of nonscientific R&D added.

- **1987-1995**
  - Transportation Equipment Manufacturing R&D: 0.05
  - Information Communication Technology Producing Industries R&D: 0.03
  - Biotechnology R&D: 0.01
  - All Other Industry R&D: 0.01
  - Total: 0.10

- **1995-2004**
  - Transportation Equipment Manufacturing R&D: 0.14
  - Information Communication Technology Producing Industries R&D: 0.12
  - Biotechnology R&D: 0.04
  - All Other Industry R&D: 0.02
  - Total: 0.16

3.5% of real GDP growth (0.10 percentage point out of 2.8 percent real GDP growth)

4.6% of real GDP growth (0.16 percentage point out of 3.3 percent real GDP growth)
Trends in top four R&D-investing industries

[2004 ($200.9 billion)]
- Pharmaceuticals 20.0% ($40.6 billion)
- Semiconductors & electric components, 8.8% ($17.7 billion)
- Motor Vehicles 8.3% ($16.6 billion)
- Software publishers 8.1% ($16.3 billion)

[1987]
- Motor Vehicles 11.4%
- Aerospace 11.0%
- Semiconductors & electric components, 9.4%
- Pharmaceuticals 8.0%
How does treating R&D as Investment change our measures of industry contributions to the growth rate in value added?  
1995-2004

<table>
<thead>
<tr>
<th></th>
<th>Growth rate in private industry VA</th>
<th>Industry share of the growth rate in private industry VA</th>
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<tbody>
<tr>
<td></td>
<td>Unadjusted</td>
<td>Adjusted</td>
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<tr>
<td>All Industries</td>
<td>3.24</td>
<td>3.35</td>
</tr>
<tr>
<td>Pharmaceutical and medicine manufacturing</td>
<td>0.5</td>
<td>1.8</td>
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<tr>
<td>Computer and peripheral mfg</td>
<td>5.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Semiconductor mfg</td>
<td>8.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Scientific R&amp;D services</td>
<td>0.4</td>
<td>1.3</td>
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<tr>
<td>All other industries</td>
<td>85.1</td>
<td>83.1</td>
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Company to Establishment Adjustment
Where within pharmaceutical and medicine manufacturing companies is R&D performed?

What we know: company employment by type of establishment
### Example: Pharmaceutical and Medicine Manufacturing: 2004 $billions

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<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>Adjustment</th>
<th>Adjusted</th>
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<tbody>
<tr>
<td>Gross output</td>
<td>155.4</td>
<td></td>
<td></td>
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<tr>
<td>Plus: Own account R&amp;D</td>
<td></td>
<td>10.9</td>
<td></td>
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<tr>
<td>Less: own account R&amp;D software double-count</td>
<td>(0.1)</td>
<td></td>
<td></td>
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<tr>
<td>Gross Output</td>
<td></td>
<td></td>
<td>166.2</td>
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<td>Intermediate Inputs</td>
<td>83.7</td>
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<tr>
<td>Less: Purchased R&amp;D</td>
<td></td>
<td>29.7</td>
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<tr>
<td>Intermediate Inputs</td>
<td></td>
<td></td>
<td>54.0</td>
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<tr>
<td>Value Added</td>
<td>71.7</td>
<td></td>
<td>112.2</td>
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<tr>
<td>Addendum: R&amp;D investment</td>
<td></td>
<td>40.6</td>
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</table>
Aggregate Output Price Index for R&D Investment

- Uses BEA industry output prices, which are based on BLS PPIs
- Fisher aggregation, weighted by industry R&D investment by R&D intensive industries
- Each industry’s R&D investment is deflated with this one aggregate index
Research, Development, and Testing Services International Trade, estimated $millions

Prior to 2001, affiliated trade is not separately available from the survey data, so is estimated.

- Affiliated Imports
- Unaffiliated Imports

- Affiliated Exports
- Unaffiliated Exports
Questions for the Advisory Committee for the Industry Estimates

- R&D Investment prices are based on investing industry output price indexes:
  - Is this sufficient or should we test other estimation approaches?
- BEA has data for a small fraction R&D investment in humanities, social sciences, and other non-science areas.
  - Should we wait for new survey data from NSF before expanding our existing estimate of social science and humanities R&D?
- Company to Establishment Conversion
  - To produce data that can be used for industry-level productivity analysis, how far should BEA go to allocate output to establishments without establishment-based R&D expenditure data?
- Intrafirm transactions
  - Should affiliated trade in R&D output change the domestic stock of R&D?