Treating R&D as Investment

In the International Accounts

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Adhering to NIPA-BOP conventional practice:

- Export of R&D reduces domestic R&D capital despite non-rival quality
  - Is this right?
- Results do not resolve direct investment position/returns puzzle ("dark matter")
  - Net effects on flows and position both small
  - Net income flows increase—wrong direction
  - Net position decreases—wrong direction
Two Aspects of International Work

- Adjust domestic R&D capital stocks for exports and imports of R&D
- Explore treating MNC R&D spending as investment - discussed here
  - 80% of U.S. business R&D done by MNCs
  - First-time aggregate estimates provided
  - R&D capital ≈10% of total capital stock of affiliates
## Impact on Flows

<table>
<thead>
<tr>
<th>Item</th>
<th>%Δ, 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current account, balance</td>
<td>-0.2</td>
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<tr>
<td>Int’l investment income, balance</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Direct investment inc., balance</strong></td>
<td>0.9</td>
</tr>
<tr>
<td>Outward</td>
<td>4.2</td>
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<tr>
<td>Inward</td>
<td>8.7</td>
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</table>
## Impact on Stocks

<table>
<thead>
<tr>
<th>Item</th>
<th>%∆, 2004</th>
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</thead>
<tbody>
<tr>
<td>Int’l investment position, net</td>
<td>1.1</td>
</tr>
<tr>
<td>Outward</td>
<td>1.4</td>
</tr>
<tr>
<td>Inward</td>
<td>1.3</td>
</tr>
<tr>
<td>Direct investment position, net</td>
<td>-3.4</td>
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<tr>
<td>Outward</td>
<td>5.1</td>
</tr>
<tr>
<td>Inward</td>
<td>8.6</td>
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</tbody>
</table>
How is R&D Shared Across MNCs?

- Joint ownership: how to account for R&D shared between among parts of MNC
  - Non-rivalry in use
  - Alternative assignment schemes
    - Assign ownership to performer/earliest owner
    - Divide into “shares”
    - Expand stock when another entity gains access
  - Recommendations?
Joint Ownership: Option 1

Assign to performer/earliest owner (following standard conventions)

**Pros**
- Generally reflects rights to transfer ownership
- Simplifies treatment of issue
  - Little data burden
- Avoids subjectivity

**Cons**
- May not reflect economic reality
  - Ignores “sharees” access to knowledge
- Poorly suited to analyze sources of growth
Joint Ownership: Option 2

Divide into “shares” belonging to the various MNC entities

**Pros**
- Better suited to analyze sources of growth
- Reflects distribution of knowledge without changing total stock

**Cons**
- Lack of necessary data—must rely on assumptions
- May not reflect total value of R&D knowledge
- Implies that parent R&D stock falls with acquisition of affiliate
Joint Ownership: Option 3

Expand stock when another entity gains access

Pros
- Best reflects access to R&D knowledge
- Best suited to analyze sources of growth

Cons
- Lack of data
- Inconsistency when adding up over different domains
- May not reflect right to transfer ownership
- Not invariant to sequence of events
- Weakens link between investment and stocks
Limitations of Available Data

- Funding vs. performance data
  - Funding preferred, but data not collected annually
  - Funding is 90-95% of performance
- Lack of information on post-R&D knowledge sales
Depreciation and Price Adjustments

Capital stock estimates

- Depreciation
  - Assumed real rate of 15%
    - (Also tested range of other assumptions)
  - May vary with IPR regimes and other factors

- Price adjustments
  - No adjustment for relative price changes in round 1
  - Further work needed
Accounting for MNC Population Changes

- Newly created or acquired firms less exits
  - Ideally, requires information on R&D stocks of entering & exiting firms
  - Infer indirectly from physical capital stocks - assume entrance effect for R&D capital is proportional to entrance effect for tangible capital
    - Uses rough estimate of tangible capital entrance effect