Not everything that counts can be counted, and not everything that can be counted counts.

— **Albert Einstein**
Intangible Capital and Macroeconomic Modeling

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www.minneapolislisd.org/research /economists/emcgrattan.html
OVERVIEW

- Central Bank policymakers need to know
  - What drives fluctuations and changes in trends
  - What is the best policy response

- National Accounts are crucial element in analysis

- But ... not everything that counts can be counted
Intangible Capital

• Can’t entirely (or easily) be counted

• But, it is important when accounting for
  
  ○ Corporate equity levels relative to GDP (always!)

  ○ Boom in the U.S. economy in the 1990s

  ○ Collapse of the U.S. net asset position in the 2000s
Three Ways to Measure Intangible Capital

- Residually: \( V - qK \)

- Directly with estimates of:
  - Expenditures (R&D + ads + organization capital)
  - Depreciation rates

- Indirectly with estimates of:
  - Tangible capital stocks
  - NIPA profits = tangible rents + intangible rents
    - intangible expenses
Intangible Capital and the Stock Market
Intangible capital and the Stock Market

- Corporate value = present value of discounted distributions
  
  \[ V_t = \sum_i \left\{ q_{T,i,t} K_{T,i,t+1} + q_{I,i,t} K_{I,i,t+1} \right\} + q_{M,t} K_{M,t+1} \]

  where \( i \) indexes countries

- With only domestic tangible capital, theory fails miserably!
Value/GDP varies a lot, but $K_{Tus}/GDP \approx 1$
**Taxes—affecting q’s—and Intangibles Important**

<table>
<thead>
<tr>
<th>Predicted Fundamental Values</th>
<th>1960-69</th>
<th>1998-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic tangible capital</td>
<td>.56</td>
<td>.84</td>
</tr>
<tr>
<td>Domestic intangible capital</td>
<td>.23</td>
<td>.35</td>
</tr>
<tr>
<td>Foreign capital</td>
<td>.09</td>
<td>.38</td>
</tr>
<tr>
<td><strong>Total relative to GDP</strong></td>
<td>.88</td>
<td>1.57</td>
</tr>
<tr>
<td><strong>Price-earnings ratio</strong></td>
<td>13.5</td>
<td>27.5</td>
</tr>
</tbody>
</table>

| Actual Values                                    |         |         |
| Corporate equities                               | .90     | 1.58    |
| Net corporate debt                               | .04     | .03     |
| **Total relative to GDP**                        | .94     | 1.60    |
| **Price-earnings ratio**                         | 14.5    | 28.1    |
Intangible Capital and the Puzzling 1990s Boom
The Puzzling 1990s Boom

- Aggregate TFP and GDP/hour were low relative to trend
- Labor taxes were rising

⇒ Standard theory predicts a depressed economy
Theory Predicts a Depressed Economy
Theory Predicts a Depressed Economy
Why was the Economy Booming?

- Two key factors:
  - Intangible capital that is expensed
  - Nonneutral technology change w.r.t. its production

- Idea: model tech boom as boom in intangible production
Why was the Economy Booming?

- Two key factors:
  - Intangible capital that is expensed
  - Nonneutral technology change w.r.t. its production

  ⇒ Increased hours in intangible production
Why was the Economy Booming?

- Two key factors:
  - Intangible capital that is expensed
  - Nonneutral technology change w.r.t. its production

  ⇒ Increased intangible investment
Why was the Economy Booming?

- Two key factors:
  - Intangible capital that is expensed
  - Nonneutral technology change w.r.t. its production

⇒ Understated growth in *measured* productivity
Intuition

- True compensation per hour

\[ w_t \propto \frac{y_t + q_t x_{It}}{h_{yt} + h_{xt}} \]

\[ \neq \frac{y_t}{h_{yt} + h_{xt}} \]

where

- \( y_t \) = output of final goods and services
- \( q_t x_{It} \) = output of intangible production
- \( h_{yt} \) = hours in production of \( y \)
- \( h_{xt} \) = hours in production of \( x \)
<table>
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<th><strong>NIPA INCOME</strong></th>
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<tr>
<td>Capital consumption</td>
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<td>Taxes on production</td>
<td>Government consumption</td>
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<td>Compensation <em>less sweat</em></td>
<td>Government investment</td>
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<tr>
<td>Profits <em>less expensed</em></td>
<td>Private tangible investment</td>
</tr>
<tr>
<td>Net interest</td>
<td>Net exports</td>
</tr>
<tr>
<td>TOTAL INCOME</td>
<td>TOTAL PRODUCT</td>
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<td>Intangible investment</td>
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## Revised National Accounts

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Theory with Intangible Capital Consistent
INTANGIBLE CAPITAL AND GLOBAL “IMBALANCES”
A Direct Investment (DI) Puzzle

• BEA reports for 1982–2006:

  o US companies earned 9.4% average returns

  o Foreign companies earned 3.2% average returns

on their foreign direct investment abroad
Why is Return Differential Large and Persistent?

Averages, 1982–2006
USDIA: 9.4%
FDIUS: 3.2%

Return on DI of US Companies Abroad

Return on DI of Foreign Companies in US
Reported FDI Return ($r_{BEA}$)

- With **no** intangible capitals,
  \[ r_{BEA} = \frac{\text{after-tax profits/tangible capital}}{\text{tangible capital}} = \text{economic return (r)} \]

- With intangible capitals,
  \[ r_{BEA} = \frac{(r \times \text{tangible capital} + \text{rents on intangible capital} - \text{intangible investments expensed abroad})}{\text{tangible capital}} \neq r \]
How Much of Difference Due to Measurement?

• To answer, develop a model with essential role for FDI and
  ○ Intangible capital that is plant-specific
  ○ Technology capital that is not plant-specific

• Construct model’s statistics using BEA methodology
How Much of Difference Due to Measurement?

Return on DI of US

Avg. Differential
BEA: 6.3%
Model: 4%

Return on DI in US

Lessons for the Central Bank

- The rise in US equity values was not “irrational exuberance”

- The 1990s boom in US was due to real, not monetary factors

- Global “imbalances” occur even when markets function well
Recommendations for National Accountants

• Keep the measurement as transparent as possible

• Leave certain intangible investments in satellite accounts

• Discontinue market value direct investment position series

• Drop the concept of net asset position