THE ROLE OF INTANGIBLE, KNOWLEDGE-BASED CAPITAL IN ECONOMIC GROWTH

Alistair Nolan
OECD Directorate for Science, Technology and Industry
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What is knowledge-based capital (KBC)?

<table>
<thead>
<tr>
<th>Computerised information</th>
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<td>Innovative property</td>
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<td>Economic competencies</td>
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- Software and databases
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- Computerised information
- Innovative property
  - Copyrights, patents, trademarks, designs
What is knowledge-based capital (KBC)?

(brand equity, firm-specific human capital, business networks, organisational know-how that increases enterprise efficiency, etc.)
Investment in KBC is growing in importance

Business investment in KBC and tangible assets in the United States (% GDP, 1972-2011)
...and growing in importance elsewhere too..

Australia, France, Japan: Investment in KBC as a percentage of GDP (1981-2010)
KBC accounts for near to or over half of all business investment in several countries

Business investment in KBC and tangible assets (% adjusted GDP, 2010)

Source: OECD calculations based on INTAN-Invest, Eurostat and multiple national sources.
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But big differences exist across countries...with implications for innovation, advanced manufacturing and trade.

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But big differences exist across countries...with implications for innovation, advanced manufacturing and trade.

“Our clothes are Italian, French and German, so the profits are all leaving China...We need to create brands, and fast”.

SG, China Industrial Overseas Development and Planning Assoc.

Source: OECD calculations based on INTAN-Invest, Eurostat and multiple national sources.
KBC relatively resilient during the crisis

(change by type of business investment, 2008-2010, % points of value added)

Source: OECD National Accounts Main Aggregates, INTAN-Invest, Eurostat and multiple national sources.
And the value of many companies is largely KBC

At the start of 2009, physical assets accounted for only about 5% of Google’s worth.

Nestle’s value (2011) = CHF 186 bn

KBC = 87%
Tangible assets = 13%

Microsoft: physical assets about 4% of total assets (2006).
KBC positively associated with GDP per capita (2000-10)

Source: OECD National Accounts Main Aggregates, INTAN-Invest, Eurostat and multiple national sources.
And KBC has spillover effects (selected OECD countries, 1995-2007)

MFP growth (% change)

Source: Corrado et al (2012)
Many products becoming more knowledge-intensive

Automotive manufacturers view leadership in control software as vital

Chevrolet Volt has 10,000,000 lines of code.
KBC relevant to a wide array of policy issues
Selected Policy Implications

- **Innovation:**
  - Adopt an enlarged concept of innovation – beyond the view in which R&D is pre-eminent.

Data, new business processes and design also drive innovation and may be affected by specific barriers and policies.

A renewed emphasis on programmes such as technical extension services that aid the diffusion of KBC to firms?

Redesign of some long-standing innovation programmes - a move from STEM to STEAM (in innovation vouchers, know-how funds and technical extension services).
Selected Policy Implications

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• **Entrepreneurship and business development:**
  - Countries that invest more in KBC are more effective in reallocating resources to innovative firms. As a share of GDP, the USA and Sweden invest about twice as much in KBC as Italy and Spain and patenting firms in the USA and Sweden can attract four times as much capital as firms in Italy and Spain.
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  - Make it easy for firms to experiment with growth opportunities.
  - Countries with more stringent regulations in product and labour markets invest less in KBC.
  - Need well-functioning systems of debt and early-stage equity finance: Investment in KBC positively correlated with debtor-friendly bankruptcy codes and the size of the VC industry.
Big differences in access to risk capital
(VC investment, 2012, % GDP)

Source: OECD Science, Technology and Industry Scoreboard 2013
Selected Policy Implications

- **Intellectual Property Rights (IPR):** An increasingly important framework condition. Aspects of IPR systems have not kept up with technological change.

  - Are copyright laws best suited to a world of paper and pencil? Might they constitute a drag on the digital economy?

  - Are aspects of some patent systems retarding innovation?

  - Evidence of declining patent quality over the last decade (i.e. the accuracy of the patent claim and whether patents reflect genuinely novel innovations).
Selected Policy Implications

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• **Tax policy:** Overall tax relief for R&D by multi-national enterprises (MNEs) could be greater than governments foresaw when R&D tax incentives were designed.

Potential annual revenue cost from income shifting by US-based MNEs may be as high as USD 60 billion, with possibly half of this due to aggressive transfer pricing of KBC-related transactions.
Selected Policy Implications

• **Measurement:** Governments should do more to properly measure investments in KBC and agree common measurement guidelines.
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  “We will be more likely to promote innovative activity if we are able to measure it more effectively and document its role in economic growth.”

  Ben Bernanke. *May 16, 2011,*
Selected Policy Implications

- **Measurement:** Governments should do more to properly measure investments in KBC and agree common measurement guidelines.

- **Creating economic value from data:**
  - Data has become a new input to production.
  - Global data creation projected to grow by 40% a year, compared with 5% yearly growth in worldwide IT expenditure.
  - Big data: things you can see at a large scale that you cannot see at a small scale. “More isn’t just more, more is different” Chris Andersen.
Selected Policy Implications

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- **Creating economic value from data:**
  - In the US, firms that base significant decisions on data analytics have higher output and productivity 5-6% higher than would be expected given their investments and use of information technology.
  - Large public sector benefits.
Selected Policy Implications

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  Not clear what optimal policy is yet: but many governments could do more in the fields of privacy protection, open data access, ICT infrastructure and skills.

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  McKinsey Global Institute, May 2011, estimates US to lack 140-190,000 people with analytical expertise and 1.5 million managers with skills to make decisions based on ‘big data’.
**Selected Policy Implications**

• **Education and training:**
  - Growing business investment in KBC amplifies the importance of getting human capital policies right.
  - And the rise of KBC has profound implications for employment and for earnings inequality.
<table>
<thead>
<tr>
<th>Country</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Japan</td>
<td>1.2</td>
</tr>
<tr>
<td>Finland</td>
<td>0.0</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.0</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.3</td>
</tr>
<tr>
<td>Norway</td>
<td>2.2</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.4</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>0.3</td>
</tr>
<tr>
<td>Flanders (Belgium)</td>
<td>5.2</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.6</td>
</tr>
<tr>
<td>Austria</td>
<td>1.8</td>
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<tr>
<td>Germany</td>
<td>1.5</td>
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<tr>
<td>Estonia</td>
<td>0.4</td>
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<tr>
<td>Average</td>
<td>1.2</td>
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<tr>
<td>Australia</td>
<td>1.9</td>
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<tr>
<td>Canada</td>
<td>0.9</td>
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<tr>
<td>Korea</td>
<td>0.3</td>
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<tr>
<td>England/N. Ireland (UK)</td>
<td>1.4</td>
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<tr>
<td>Poland</td>
<td>0.0</td>
</tr>
<tr>
<td>France</td>
<td>0.8</td>
</tr>
<tr>
<td>Ireland</td>
<td>0.5</td>
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<tr>
<td>Cyprus (UK)</td>
<td>17.7</td>
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<tr>
<td>United States</td>
<td>4.2</td>
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<tr>
<td>Italy</td>
<td>0.7</td>
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<td>Spain</td>
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Source: OECD Survey of Adult Skills, 2013
Problem-solving proficiency among younger and older adults

Percentage of adults aged 16-24 and 55-65 scoring at Level 2 or 3 in problem solving in technology-rich environments

Source: OECD Survey of Adult Skills, 2013
Selected Policy Implications

- **Competition Policy**: Faces new challenges in industries founded on KBC, particularly in the digital economy, where: never before have leading firms grown so large so quickly, and the nature of competition may differ from other sectors.

- **Corporate Reporting**: Benefits could be had from better corporate disclosure of investments in KBC.
Supporting Investment in Knowledge Capital, Growth and Innovation

http://oe.cd/kbc