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Private and Public Intangible Capital: Productivity Growth and New Policy Challengers

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Private and Public Intangible Capital: Productivity Growth and New Policy Challenges

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Complete the coverage of intangible investment by industry making possible analysis of productivity for the total economy based on a complete accounting of intangible capital inputs.

- Existing measures of intangible investment, INTAN-Invest, cover a subset of industries: the market sector
- SPINTAN covers the nonmarket sector
- New conceptual and measurement challenges
  - Identify the asset boundary in the total economy
  - Impute a rate of return to public capital formation
  - Investigate behavioural link public to private and vice versa (e.g. role of public sector R&D on private sector)
Investment slowdown: a common trend?

**GFCF % of GDP, 1970-2016**

**General government**

**Private sector (includes SOEs)**

Data sources: AMECO, OECD.stat

Note: EU Core 9 is Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, and the United Kingdom. EU Cohesion 4 is Greece, Ireland, Spain and Portugal. EU-12 are the 12 member states that joined the EU between 2004 and 2007.
Some education and health is a mix of private and public, market and non-market. So to do market sector analysis, one should really break education and health into market and nonmarket.

- And one should really do this for all other industries too.
- What do we do?
  - We focus on a number of industries that potentially have significant non-market involvement.
  - We break those industries into market and non-market.
The scope of intangible assets used by the public sector: industries of interest

Table 1: SPINTAN Industries of Interest

<table>
<thead>
<tr>
<th>NACE SECTION</th>
<th>INDUSTRY TITLE</th>
<th>NACE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB</td>
<td>Scientific research and development</td>
<td>72</td>
</tr>
<tr>
<td>O</td>
<td>Public administration and defence; compulsory social security</td>
<td>84</td>
</tr>
<tr>
<td>P</td>
<td>Education</td>
<td>85</td>
</tr>
<tr>
<td>QA</td>
<td>Human health activities</td>
<td>86</td>
</tr>
<tr>
<td>QB</td>
<td>Residential care and social work activities</td>
<td>87-88</td>
</tr>
<tr>
<td>R</td>
<td>Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities</td>
<td>90-91</td>
</tr>
<tr>
<td></td>
<td>Gambling and betting activities; sports activities and amusement and recreation activities</td>
<td>92-93</td>
</tr>
</tbody>
</table>

NOTE—NACE Rev. 2.

Besides Public administration and defence, other industries in the table contain a mix of market and nonmarket producers.
Multiple measurement dimensions of Public intangibles

Nonmarket sector - industries

Information, Scientific and Cultural assets

NA intangibles (Software, R&D, Mineral exploration)

Societal Competencies

Non NA intangibles (Open data, Cultural and heritage, including design, Brands, Organizational capital, Function-specific human capital)
Measuring nominal intangible investments

\[ P^N N_t = \sum_{i=1}^{N} \sum_{s=1}^{S} (\gamma_{i,s,t}^{own-account} \lambda_{i,s,t}^{own-account} \text{OwnCost}^{Indicator}_{i,s,t} + \gamma_{i,s,t}^{purchased} \lambda_{i,s,t}^{purchased} \text{Purchased}^{Indicator}_{i,s,t} ) \]

where:

- \( P^N N_t \) is nominal expenditure, in industry \( i \) and institutional sector \( s \);
- \( \text{OwnCost} \) and \( \text{Purchased} \) are time-series indicators of the own-account and purchased components of intangible investment;
- \( \lambda \) indicates the adjustment to the time-series indicator that is needed to transform it to a sector-industry gross output (own-account) or gross spending measure.
- \( \gamma \) is the capitalization factor, namely, a parameter that adjusts a spending measure to a measure of investment—a fraction of revenues or employee time, say, devoted to long-lived activities.
Intangible investment in the **total economy**: measures developed so far

Two sets of intangible measures by industry and institutional sector:

**CHS type assets** (Data and Trends)
*(Organizational capital (purchased and own account), Brands, Design, Training)*

- Geographical coverage: (AT, BE, DE, ES, FI, FR, IT, NL, SE, UK, US)
- Time coverage: 1995-2010

**CHS type assets and NA intangibles** (SOG analysis)

- Geographical coverage: (DE, ES, FI, IT, UK)
- Time coverage: 1995-2009
Overall selected intangible investment accounts for 8% to 3% of total value added with private and public sectors accounting on average for 5% and 0.8% respectively.

<table>
<thead>
<tr>
<th>Country</th>
<th>MKT</th>
<th>NMKT</th>
</tr>
</thead>
<tbody>
<tr>
<td>es</td>
<td>3.08</td>
<td>0.22</td>
</tr>
<tr>
<td>at</td>
<td>4.38</td>
<td>0.35</td>
</tr>
<tr>
<td>fr</td>
<td>5.66</td>
<td>0.59</td>
</tr>
<tr>
<td>de</td>
<td>4.68</td>
<td>0.59</td>
</tr>
<tr>
<td>nl</td>
<td>5.57</td>
<td>0.69</td>
</tr>
<tr>
<td>it</td>
<td>3.73</td>
<td>0.70</td>
</tr>
<tr>
<td>se</td>
<td>5.71</td>
<td>0.76</td>
</tr>
<tr>
<td>be</td>
<td>5.98</td>
<td>0.77</td>
</tr>
<tr>
<td>fi</td>
<td>4.09</td>
<td>1.07</td>
</tr>
<tr>
<td>uk</td>
<td>6.34</td>
<td>1.36</td>
</tr>
<tr>
<td>us</td>
<td>6.33</td>
<td>1.58</td>
</tr>
</tbody>
</table>
Intangible shares of Non-Market and Market value added

In most advanced countries, US, UK and FI, nonmarket sector is more intangible intensive than the market sector. In the remaining countries it is the opposite (for these assets). But there is also interesting variation between countries.
Organizational capital accounts for the largest share of intangible investment both in the nonmarket (45%) and market (35%) sector.
Organizational capital: shares in total market and nonmarket intangible investments

On average purchased OC accounts for a larger share both in nonmarket and market sectors but shares varies considerably across countries and sectors.
Return to nonmarket capital

- Once we have capitalized public intangibles we want to evaluate their contribution to productivity growth.
- To achieve this goal we need to impute a net return to public investments.
- A SPINTAN background paper by (Corrado and Jaeger, 2015) explores using the social rate of time preference (Feldstein, 1964; OECD 2009) as a relevant alternative for imputing a rate of return to government capital.
- But at this stage we adopt the national accounts assumption of a zero nonmarket sector rate of return.
Sources of growth analysis

- Adding national accounts intangibles (R&D, software, and artistic and entertainment originals plus mineral exploration) to the SPINTAN and INTAN-Invest measures of intangibles we are able to look at a fairly complete picture of intangible inputs to total production across a sample of advanced countries:
  - Finland, Germany, Italy, Spain, and the United Kingdom

- Data sources: SPINTAN, INTAN-Invest and EUKLEMS

- Contributions to labour productivity growth of market and nonmarket sectors.
The performance of advanced economies differs widely according to market versus nonmarket sector. In Germany, UK and Finland intangible capital is an important source of growth for the *public sector*. 

![Graph showing contributions to labour productivity growth from various sectors from 1995 to 2009.]
At the very beginning of the financial crisis, intangible capital positively supported labour productivity growth of both market and non-market sectors in the advanced economies.
Total Factor Productivity Growth (1995-2007) and market and non-market intangible capital deepening contributions
Policy challenges

- A primary characteristic of intangible capital, widely supported by growth accounting exercises and macroeconomic studies, is to be growth-promoting.
- This is because intangible investments likely generate spillovers to the economic system being non-rival and possibly non-excludable. Such spillovers, if they exist, might be within the private sector and/or between the public and private sector.
- In the light in particular of the claim and counter-claim around public sector austerity and fiscal policy in Europe, it would be vital to know which, if any, public sector intangibles had positive spillovers to the rest of the economy.
SPINTAN: Next steps

- Complete the estimates of National Account Intangibles (R&D and Software) cross classified by industry and institutional sector.
- Generate real measures of public intangible investments and net capital stocks.
- Impute a rate of return to nonmarket capital.
- Provide a deep investigation of mechanisms through which the synergies between Public and Private sector affect economic growth.
Backup slides