



European
Research Area

EUROPEAN POLICY BRIEF



INNODRIVE

Intangible Capital and Innovation: Drivers of Growth in the EU

An EU-funded research project evaluating intangible capital resources throughout the EU and assessing their capacity to generate growth

Ongoing project

December 2009

INTRODUCTION

Setting the scene

Intellectual assets fuel innovation and promote economic competitiveness. The importance of these assets for encouraging growth is reflected in the European Union's Lisbon process. Little is known, however, about the contribution of intangible capital to economic performance.

Objectives of the research

The aim of this research project is to improve our understanding of intangible capital by providing new data on it and identifying the impact of intangible capital on economic growth. In past decades, the key drivers of economic growth were investment in manufacturing, improvements in educational attainment and investment in R&D. But these factors alone do not explain growth performance today.

This project will enable us to quantify the increasing importance of intangible capital as one of the main factors underlying economic growth. INNODRIVE thus seeks to improve measurement of the capital embodied in intellectual assets (e.g. human capital, R&D, patents, software and organisational structures).

SCIENTIFIC EVIDENCE AND ANALYSIS

Scientific approach/ methodology

An essential feature of INNODRIVE is the way it combines corporate and national-level analysis (micro and macro). There are considerable synergies from conducting analysis at both the micro and macro level since these components can inform one another.

Results from the company-level evaluation in the micro component may be aggregated up to the national level to provide data to augment the macro approach.

The national-level evaluation in the macro component may be used to supplement the company-level evaluation, particularly where company-level information on intellectual assets is not available (e.g. software, databases and other R&D).

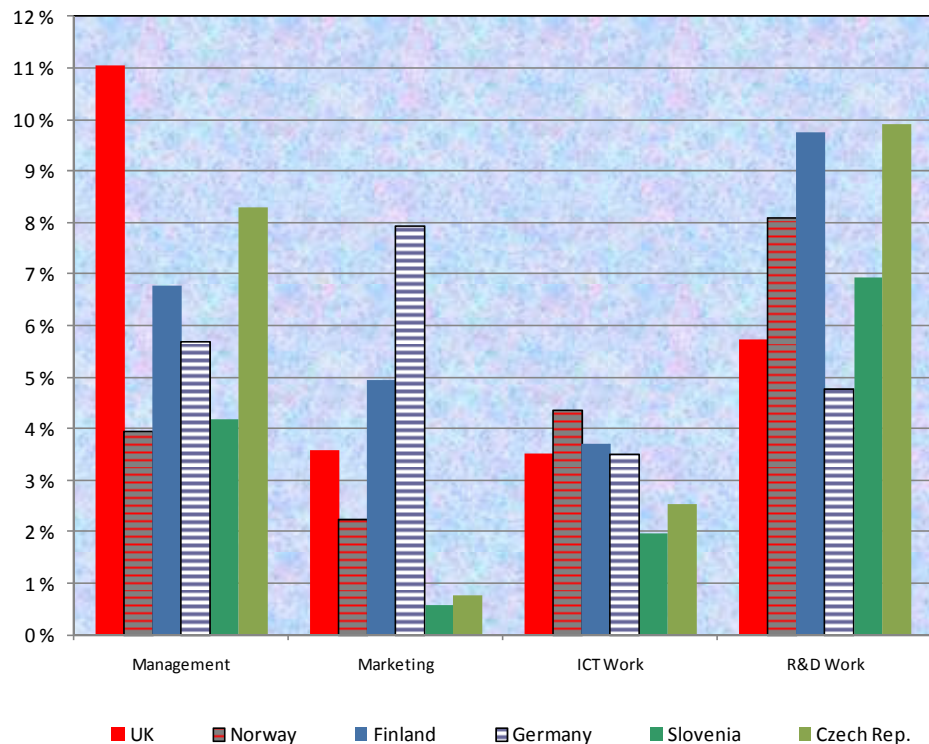
At the micro level, INNODRIVE will assess contributions of intangibles to the growth of companies. This will be done by:

- a) examining linked employer–employee datasets in a selection of old and new member states. (These data sets have only recently been established.)
- b) using a performance-based methodology to analyse how firms exploit knowledge and human capital to increase their productivity. (How mobile workers react to these processes will also be examined.) Organisational capital is valued by estimating the productivity differential between organisational workers and all workers. Using the Hellerstein, Neumark and Troske (1999) approach, the influence of the share of organisation workers on output is shown as an approximate measure of organisation workers' additional value.

Using ISCO (International Standard Classification of Occupations) codes as a benchmark, we have defined 41 occupational categories which we are using to construct a coherent set of estimates of organisational, R&D and ICT (information and communications technology) capital at the company level.

Initial analysis of linked employer–employee data has already been carried out in Finland, Norway, the UK, Germany, the Czech Republic and Slovenia. The initial findings suggest there is scope for cross-country comparable analysis in the micro part of the project. The share of organization workers (the sum of the share of management and marketing workers) has varied between 5% in Slovenia and 15% in the UK.

Figure 1. Share of management, marketing, ICT and R&D workers from all workers 2003



Aggregation to national level in the business sector makes the results comparable to the main results obtainable at macro level. At the country (macro) level, INNODRIVE will provide new estimates of intangible capital for the whole EU27. During the project's first and half years, the macro component of INNODRIVE has:

1. identified detailed criteria for the selection of intangible variables (using Corrado, Hulten and Sichel (2005) as a starting point);
2. outlined a general estimation strategy for INNODRIVE;
3. examined available data sources for intangible variables excluded from gross fixed capital formation and defined an estimation method;
4. provided a first estimate of new intangible assets for the EU-27; and executed growth accounting analysis in a set of countries, where tangible capital data are also available and comparable;
5. executed growth accounting analysis in a set of countries, where tangible capital data are also available and comparable.

New knowledge and/or European added value

New data on intangible assets and new estimates of the capacity of intangible capital to foster growth will be generated by the project. All data produced at the national level (from the macro part and aggregated figures from the micro part) will be made publicly available on the project's website at www.innodrive.org. We are collaborating with other knowledge capital projects underway in the ENEPRI network, with continuous data interchange among the projects (in particular between INNODRIVE and the COINVEST project).

Table 1 gives the breakdown of the intangibles we use.

Intangible Capital	
Macro: Corrado-Hulten-Sichel	Micro
<i>Economic Competencies</i>	
1) Brand Equity:	1) Organization capital
- Advertising	- Management
- Market Research	- Marketing
2) Firm-specific resources:	
- Firm-specific human capital (e.g. training)	
- Organization structure (e.g. management)	
<i>Innovative Property</i>	
1) Scientific R&D	1) Scientific R&D
2) Non-scientific R&D	2) Non-scientific R&D
- R&D in social science and humanities	
- Mineral exploration	
- Motion picture films, other entertainment	
- Architectural and engineering design	
- Product development in financial industry	
<i>Digitalized information - ICT capital</i>	
1) Software	1) ICT personnel assets
2) Database	

Main findings

Progress in the macro component of INNODRIVE has resulted in the construction of initial estimates of gross fixed capital formation in 'new' intangibles as a share of GDP for the EU-27 (excluding Luxembourg) and Norway for the years 1995-2005. New intangibles refer to intangible items not currently included in the national accounts measures: in Table 1 all the items listed under "economic competencies" and those listed under "innovative property" ("mineral exploration" and "new motion picture films and other forms of entertainment" are excluded here).

Figure 2. New Intangibles Share of GDP: European Countries 1995-2000

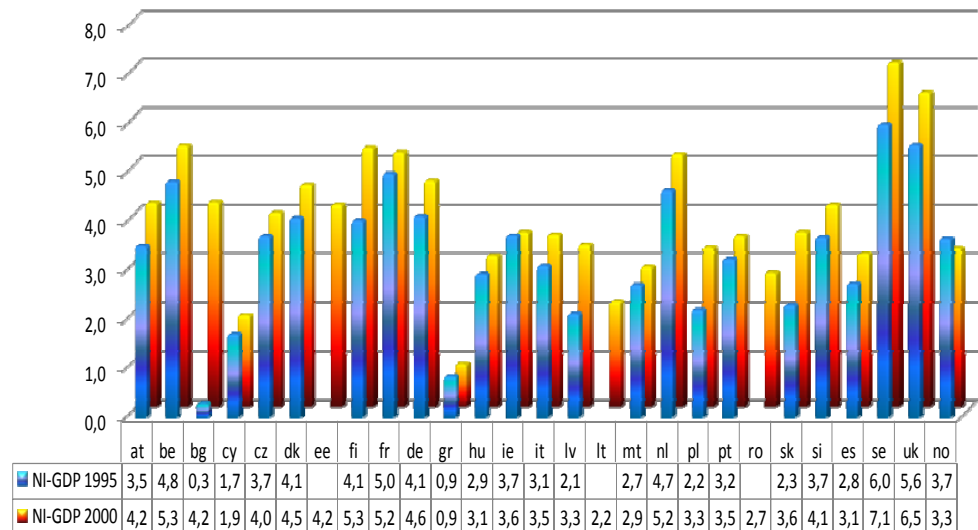
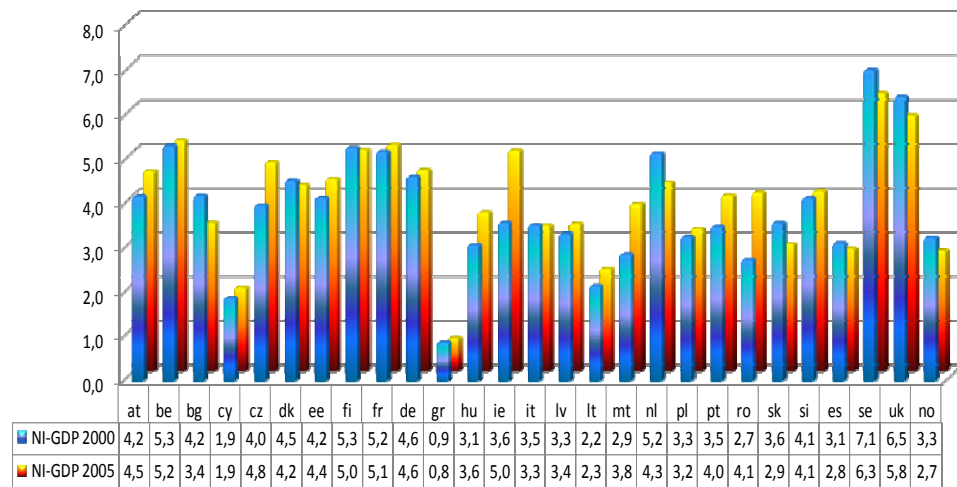


Figure 3. New Intangibles Share of GDP: European Countries 2000-2005

Preliminary findings suggest that new intangible capital, measured as a share of GDP, has increased since 1995. Between 1995 and 2005, the increase averaged around 1 percentage point across countries. The Nordic countries, except Norway, were characterised by high levels of intangible capital investment. The UK, the Netherlands, Belgium and France also made significant investment in new intangible capital (measured as a share of GDP) as well as Eastern Europe as a whole. Germany was representative of the average, with intangible capital investment of around 4% of GDP.

The development of intangible capital over time was more heterogeneous across countries between 2000 and 2005. For most countries, there was a slowdown in the rate of increase in the share of intangible investment of GDP, but not in Ireland and Malta. Overall, new intangible shares of GDP are highly heterogeneous across countries:

- from 2 % to 7% of GDP;
- in 1995-2000 the most dynamic countries are the Eastern European economies;
- in 2000-2005 all the Old EU members (EU15) except Austria recorded a decrease of the GDP share of intangibles;
- economic competencies account for the largest share of intangibles, ranging from 45 % to 75% of all intangibles assets across all countries;
- for most of the selected economies, advertising and organisational capital account for the biggest share of economic competencies.

Growth accounting in a set of countries also reveals interesting results. Labour productivity, which in the long term is commonly viewed as connected to the living standards of the workforce, is strongly promoted by the accumulation of intangible capital. Investing in intangibles is therefore an engine of rising social welfare. With the inclusion of intangible capital, the “unexplained” component of productivity growth, the so-called Total Factor Productivity, becomes less important, while physical capital turns out to be strongly complementary with intangible capital:

- In 1995-2000, the capitalization of intangibles increased labour productivity in all countries considered, while in 2000-2005 it had the opposite effect.
- The relative contribution of capital deepening and TFP to labour productivity growth changed considerably after the inclusion of all intangibles; the rate of capital deepening increased and the growth of TFP decreased.
- The fall in the rate of TFP growth indicates that before capitalization a portion of labour productivity growth that was attributed to TFP was actually driven by intangible capital deepening.

In the micro component of INNODRIVE, the Finnish and Norwegian data suggest that the value of organisational capital is around 11% of sales in Finland and 14% in Norway. The value of R&D assets is around 12-13% both in Finland and Norway. Finally, the value of ICT assets accounts for 2-4% of sales. Initial estimates indicated the figure is only half that in the Czech Republic and Slovenia, while no results on organisation capital per sales at aggregate level is yet available in Germany and the UK. We can see that intangible capital as the sum of organisation capital, R&D assets and ICT personal assets is likely to exceed 30% of sales:

- The micro approach leads to the same conclusion as the macro approach. That is: economic competencies are the main component of intangible capital.
- This is true especially if advertising and national-level measures on training provided by firms are included in it.
- Estimates of intangible capital at micro level are likely to exceed those obtained in national level calculations. Figures are still not too dissimilar to the value of intangibles obtained in the macro approach.

Key messages for policy-makers, businesses, trade unions and civil society actors

Taking intangibles seriously

An improved understanding of the role of intangibles will have important implications for company-level decision-making and economic growth. These, in turn, will have knock-on effects on savings, wealth and the income share in the economy. In 1990s the expansion of higher education and investment in R&D was perceived to be the engine of economic growth. In 2000s and 2010s intangible capital is to be viewed as the main impetus of economic growth; the significance of a skilled workforce for economic growth lies in its ability to create value added in the form of intangibles.

Key messages

The key messages emerging from the analysis undertaken **in the first year** of the INNODRIVE project are:

1. Intangibles have been a relevant source of growth across European countries, so they cannot be omitted from national account data. The growth potential associated with intangible capital accumulation in manufacturing, service industries and the rest of the economy is substantial.

2. Investment in intangibles appears to have weakened between 2000 and 2005, which may not bode well for European competitiveness. This was not the case – or was less evident - in some of the Eastern European countries (Romania) and in Ireland. The growth in Eastern Europe since 2000 may, in turn, be explained by low initial levels. Further investigation aims to reveal the causes of this weakness.
 3. Intangible capital is particularly important in the service sector, where the relative productivity of organisational capital is highest. Intangible capital plays a stronger role in the UK, where the share of intangible capital from GDP is one of the highest. In the UK production workers account for 20.1% of all workers, while the share is around 40% in Central Europe (including Germany).
 4. The market valuation of firms is correlated with measures of intangible capital even after that explained by economic forecasts and book values.
 5. Open issues include the refinement of the correct range of production inputs, whether to be classified as intermediate consumption or intangible investment. Examples are training provided by firms and double accounting of R&D and ICT investments (database and software investments) as they are often approximated in accounting systems by employment compensation in related occupations.
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PROJECT IDENTITY

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Consortium	<ul style="list-style-type: none">➤ Centre for European Policy Studies (CEPS), Belgium➤ Deutsches Institut für Wirtschaftsforschung (DIW, German Institute for Economic Research), Germany➤ Statistisk sentralbyrå (STATNO, Statistics Norway), Norway➤ National Institute of Economic and Social Research (NIESR), UK➤ Inštitut za ekonomska raziskovanja (IER, Institute for Economic Research), Slovenia➤ Elinkeinoelämän tutkimuslaitos (ETLA, Research Institute of the Finnish Economy), Finland➤ Národohospodárský Ústav AV ČR (Center for Economic Research and Graduate Education of Charles University), Czech Republic➤ Libera Università Internazionale degli Studi Sociali Guido Carli (LUISS), Italy
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Duration	March 2008 - February 2011 (36 months)
Budget	EC contribution: € 1.496.523
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