



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 their capacity to generate growth

Final conference

February 2011

INTRODUCTION

Setting the scene

Evidence from new data on intangibles supports European policy-making on 'Smart growth' and 'Innovation Union' initiatives.

Objectives of the research

The European political agenda – encapsulated in the Europe 2020 strategy – recognises the importance of investment in knowledge, innovation, education and ICT as drivers of 'smart growth'. The 'Innovation Union' flagship initiative of Europe 2020 stresses the role of innovation for growth and the importance of enhancing the welfare of European citizens and solving societal challenges.

The aim of the INNODRIVE research project is to improve our understanding of intangible capital by providing new data on intangible capital and identifying its impact on economic growth. In recent 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. The results of the INNODRIVE project show that economic competence related to organisational capital of management and marketing is one of the key drivers of growth.

SCIENTIFIC EVIDENCE AND ANALYSIS

Scientific approach/ methodology

A central theme of the smart growth strategy recognises the need to treat intangibles as investments, creating future value, rather than as intermediate costs. INNODRIVE produces new estimates of intangibles for EU27 countries and Norway following the approach of Corrado, Hulten & Sichel (2006) (hereinafter CHS). Besides computerised information (software and database), this new approach includes the following items, which are often excluded from both the bookkeeping systems of companies and the national system of accounts:

- innovative property – scientific and non-scientific R&D, with scientific R&D leading to a licence or a patent, mineral exploration, copyright and licence costs (spending for artistic originals) – and
- economic/firm competences (spending on reputation (advertising), firm specific training and organisational capital)

In the CHS analysis, estimates of the purchased part of intangible investment are based on findings from a number of empirical surveys. For the own account component, they make broad assumptions, since expenditures on labour, intermediates and capital used to create intangible capital at the company level are difficult to determine.

INNODRIVE advances the CHS approach by developing new data on intangibles at the company level, which allow us to analyse different types of intangibles and their role in economic performance and growth. Using both expenditure- and performance-based estimates of intangible capital, company data provide information on the own account part of intangible investment. The expenditure-based approach estimates the combination of labour, intermediates and capital required to produce intangible assets, based on the simplifying assumption that intangible investment is proportional to the salary costs of ICT, R&D and organisational (management and marketing) personnel. The performance-based approach replaces management and marketing salary costs by the estimated productivity of the same type of work. Performance-based estimates are larger in comparison to the expenditure-based estimates, which helps to narrow the well-known gap observed between market values and book values of assets.

New knowledge and/or European added value

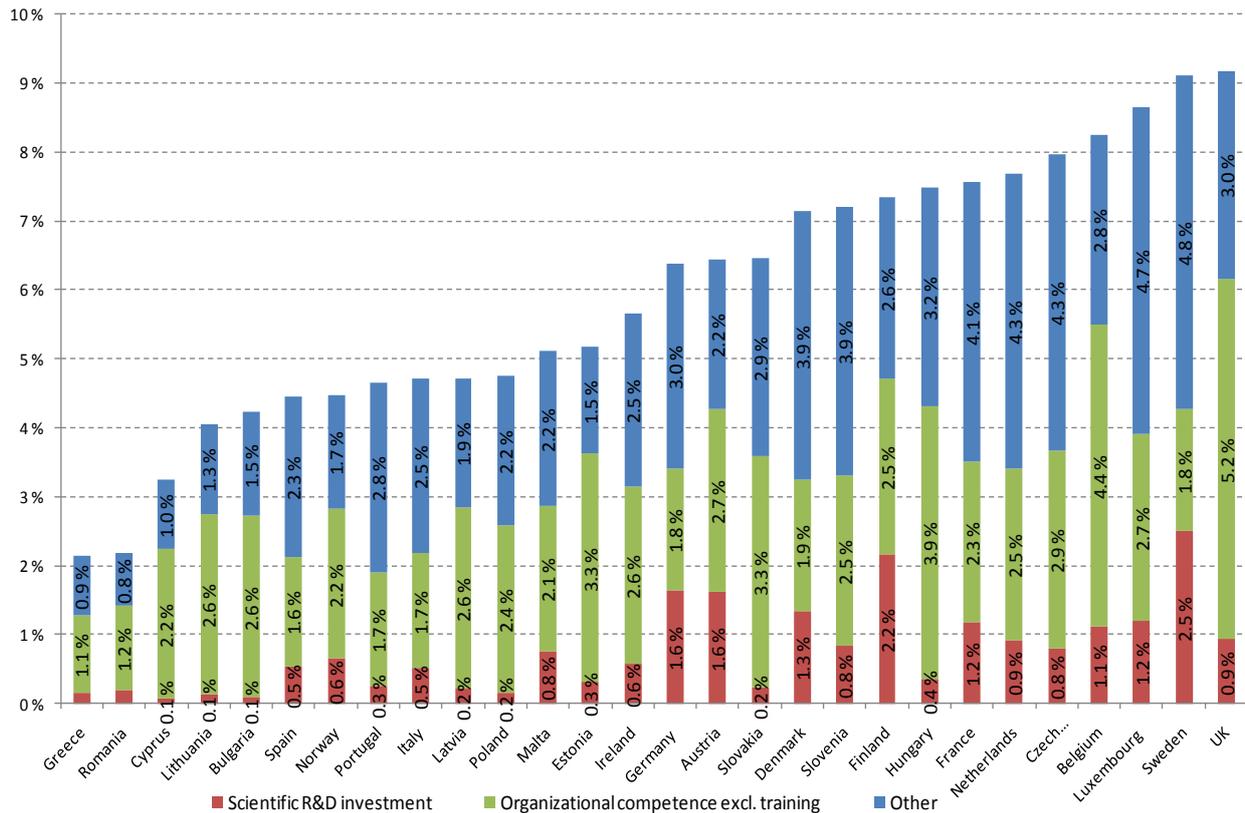
All data produced at the national level (macroeconomic data and aggregated figures from the micro data) are publicly available on the project's website (www.innodrive.org). INNODRIVE is actively collaborating with other knowledge capital projects underway in the EU 7th framework programme (in particular the COINVEST project) and with the Conference Board in the US, in order to build up a consistent picture of intangible capital in the EU27, Norway and the US. The data facilitate analysis of the role of intangibles for the European Union's smart growth and Innovation Union strategies.

Main findings

Innovation is more than R&D: Other intangibles matter for creating value

Figure 1 presents investment in intangibles (R&D, organisational competence and other factors) as a share of conventional GDP in 2005 based on national accounts in Europe (Luxembourg dropped with very high new financial product share). This can be seen as one indicator of innovation intensity, measuring the cost of innovation, which is considerably higher than R&D alone.

Figure 1: Intangibles as share of GDP (%) 2005: EU – 27 countries (and Norway)



All countries with traditionally high rates of R&D (such as Sweden, Finland and Germany) rank above average in terms of their investment in intangibles (company-level data also suggest that R&D in Norway is underestimated). However, many countries that are not R&D-intensive rank highly using the broader measure of innovation intensity (the UK, Belgium the Czech Republic, the Netherlands and Hungary; organisational capital for Germany is underestimated here). This phenomenon points to a different type of innovation model; one that emphasizes organisational competence. In addition, Sweden, Luxembourg, the Czech Republic and France are intensive in other types of intangibles (which capture training, architectural design, new financial product and databases and software).

The share of new intangibles in GDP not currently included in the national accounts increased in European countries by around 1 percentage point during the ten-year period from 1995 to 2005. Compared with 1995, expenditure in 2005 on new intangible assets has increased in almost all countries, except Spain (where the share has remained unchanged), Greece, Estonia and Norway. Generally, Nordic countries demonstrated particularly high levels of intangible capital investment, with the UK, the

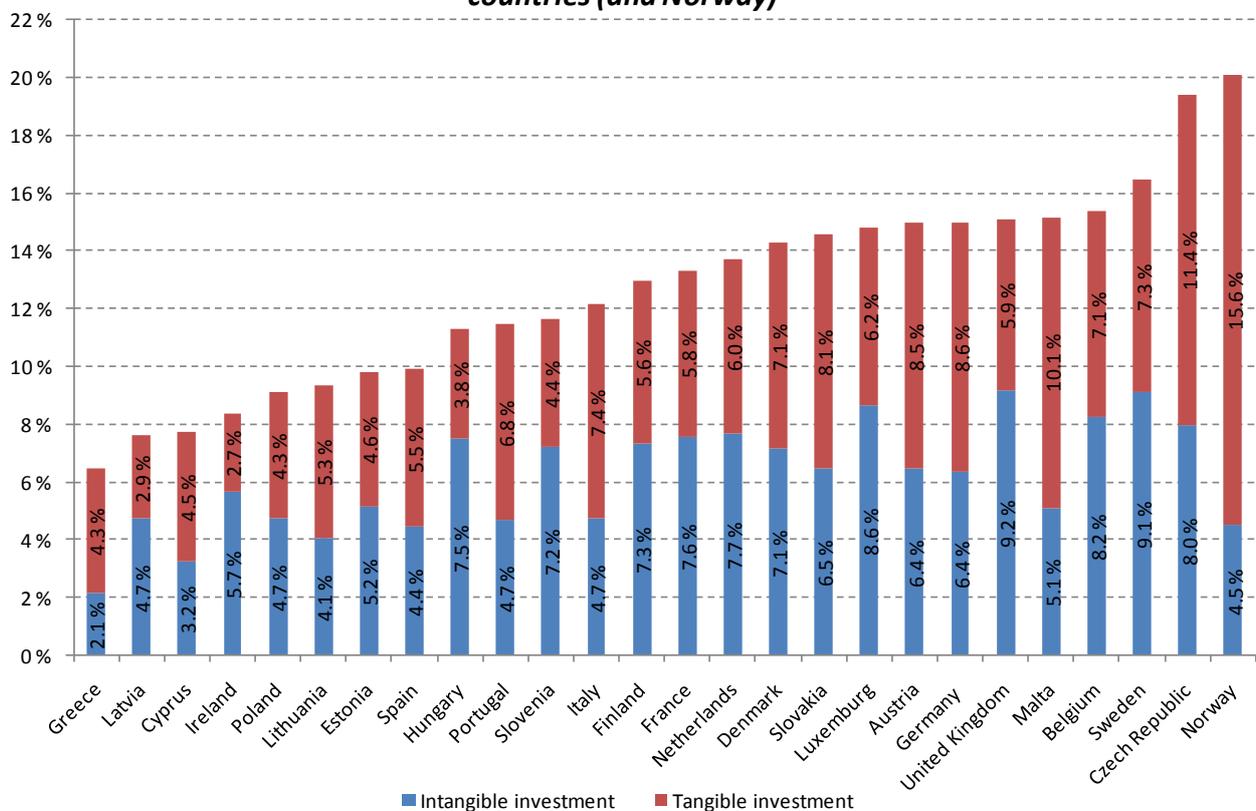
Netherlands, Belgium and France also making significant investments together with Eastern Europe as a whole.

The development of intangible capital over time was 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 vary considerably across countries:

- ranging from 2% to 9% of GDP, but with the Eastern European economies being able to catch up with the skill-intensive countries;
- showing steady investment share of value added in 2000-05 in all the old EU member states (EU15) except Austria; and
- with economic competencies accounting for at least half of all intangibles, ranging from 45% to 75% of intangibles assets across all countries, advertising and organisational capital being typically at the core.

Total tangible and intangible investments are fairly evenly distributed throughout Europe. Norway, Czech Republic Sweden, Belgium and Malta rank as the top countries in the half of countries with business investment intensity between 13%-20% of GDP. Other countries have total private investment share of around 10% of GDP.

Figure 2. Tangible and Intangible Investment as share of GDP (%) 2005: EU – 27 countries (and Norway)



Countries with relatively low intangible investment have high levels of tangible investment. The figure can be seen as an indication of the degree of transition towards the knowledge economy in 2005.

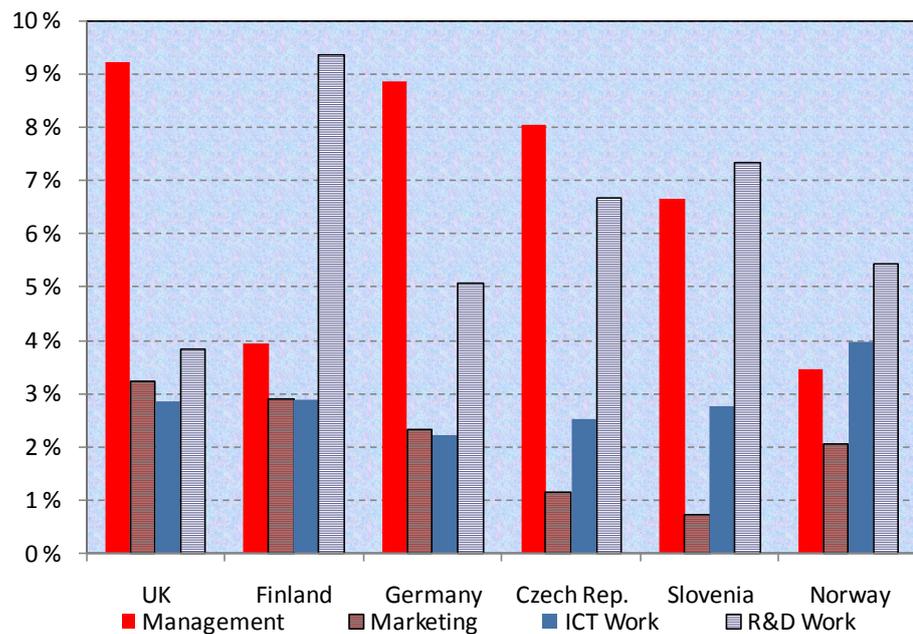
Average impact of capitalizing intangibles on GDP

The capitalization of intangibles implies an average increase of 5.5% of GDP for the EU27 over the period 1995-2005. The average increase for the EU15 GDP is slightly lower (5.4%), while for the new member states (NMS), it is one percentage point less (4.5%).

Structures of intangibles differ across countries

Aggregation of company-level data gives statistics on business sector intangibles that are comparable to data obtained at the country level. In the six countries with micro data, we find substantial variation in the shares of occupations engaged in producing intangible capital.

Figure 3. Share of management, marketing, ICT and R&D workers (percentage of all workers, 2003)

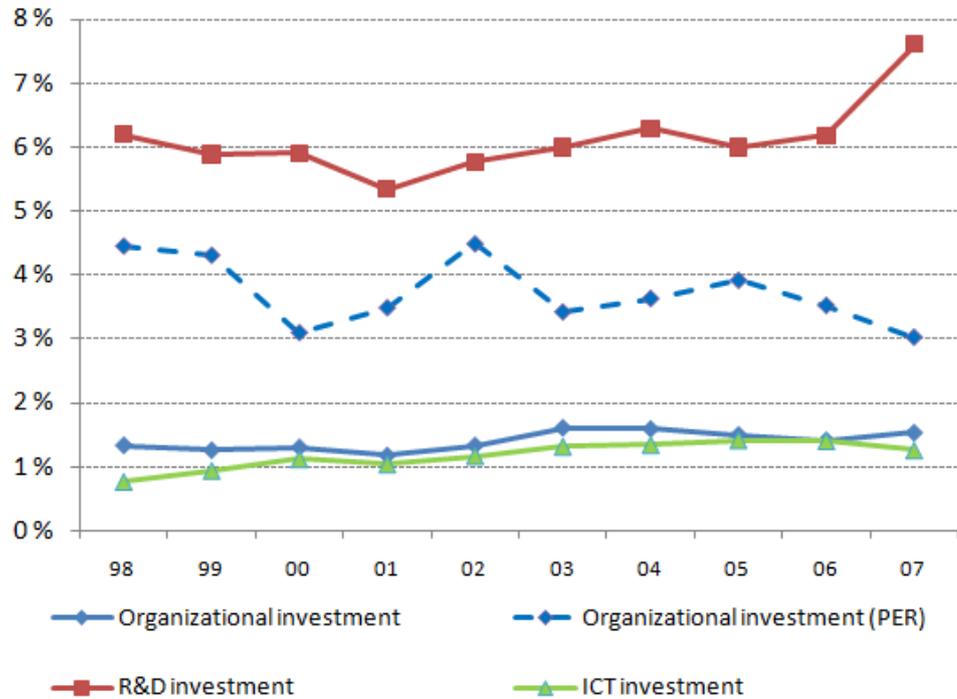


Including all intangible-type workers in the analysis gives more harmonised figures of workers engaged in intangible capital production than counting only the number of managers. The total share of intangible capita-type workers is typically around 18%. The share of organisation workers (the sum of the share of management and marketing workers) varies between 13% in the UK and 5.5% in Norway, while the respective R&D worker shares tend to be higher in countries with lower organisation worker shares (only 4% in the UK compared with 9% in Finland). Organisational workers are the largest group with the UK at the top at around a 12% share. The share of managers is around 9% in the UK, 4% in Finland, 8% in the Czech Republic, 9% in Germany, 3.5% in Norway and 6.5% in Slovenia.

Analysis of intangible capital at the company level shows that that Nordic countries are intensive in R&D capital and fairly poor in organisational capital (managerial and management). Large countries – the UK and Germany – are rather intensive in organisational capital and have relatively less R&D capital. The UK, on the one hand, and the two Nordic countries Finland and Sweden, on the other, can be taken as two extreme opposite examples of either organisational capital-driven or R&D-driven economies (Figure 1). The company-level data for Finland and the UK show the same structural differences in intangible capital. Finland and the UK are two examples of either organisational capital- or R&D-driven

economies. Figures 4 and 5 show how the structure of intangible capital has evolved in Finland and the UK, based on firm-level data. New value-added figures are generated in the respective business sectors to include the investment in intangibles.

Figure 4. Development of investment in intangibles as a share of new value added: Finland



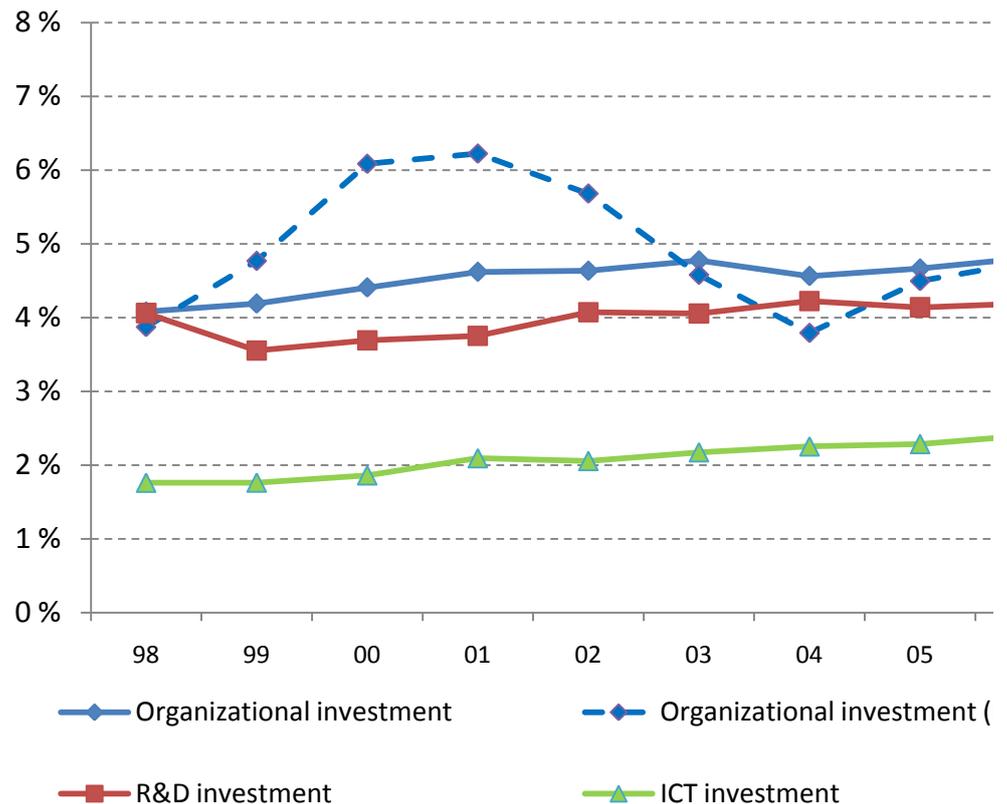
Note: Covers non-farm market sectors.

Sources: Employee data from Confederation of Finnish Industries; Asiakastieto's company information database.

The investment rate for all intangibles (R&D, ICT and organisational capital investment) is around 8% of value added in Finland and around 10% of value added in the UK. The UK also has considerable R&D activity when a more holistic definition of R&D-type work is used, covering engineering and architectural design work (in national estimates 0.9% of GDP in Figure 1). This wider definition accounts for a greater R&D effort in service industries.

The expenditure-based approach gives only part of the picture regarding the value of intangibles when they are owned by the firm and employees are not fully compensated for the value of intangible production. Indeed, the performance-based approach increases the relative importance of organisational investment. This is explained by the widely observed gap between productivity and wage costs of organisational workers. Using the performance-based approach, organisational investment is now more similar to R&D investment in Finland, which is also supported by its impact on the market value of Finnish listed firms.

Figure 5. Development of investment in intangibles as a share of new

value added: the UK

Note: Covers non-farm market sectors excluding sectors CA, DF, E, F, J.

Sources: Annual Survey of Hours and Earnings, Labour Force Survey, Annual Business Inquiry.

In the UK, organisational investment exceeds R&D investment regardless of the estimation method used. Organisational investment (the largest component of organisational competence in the national estimates) has decreased over recent years in both countries when the productivity of organisational-type work is used to construct these estimates. This decline may call for new types of innovation policy measures. In national accounting, business sector investment in organisational capital (economic competence excluding training) are also highly important. They are on average 2.6% of GDP; while investment in (scientific) R&D is over three times lower (0.8%).

Accumulation of intangible capital promotes labour productivity and well-being

Growth accounting for a set of countries reveals interesting results. Labour productivity, a measure of living standards, depends strongly on the accumulation of intangible capital. With the inclusion of intangible capital, the 'unexplained' component of productivity growth, the Total Factor Productivity (TFP), becomes less important, while physical capital turns out to be strongly complementary to intangible capital:

- Over the period 1995-2000, the capitalisation of intangibles increased labour productivity in all countries considered, while in 2000-05, 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. Capital deepening becomes the dominant source of labour productivity growth

In an analysis of regional effects in Germany, Finland and the UK, company-level productivity is also shown to be strongly related to firms' own intangible capital as well as regional intangible capital, suggesting positive localised spillovers. Productivity is highest in firms that also have considerable human capital. There is a need to be clear about the distinction between human capital and intangibles; intangibles enhance the profitability of economic activity while human capital is owned by the employee and capitalised in wages. Organisational capital, i.e. the competence of management and marketing workers appears to be the most clearly related to productivity growth.

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

Taking intangibles seriously

The significance of a skilled workforce for economic growth lies in its ability to create value added in the form of intangibles.

The INNODRIVE project has documented the important role that intangibles play as a new source of growth; it is crucial therefore not only to measure them but also to improve their management and exploitation. This is why policy measures should aim to stimulate a better understanding of intangibles by including them in the GDP measure and encouraging their use by means of appropriate incentives.

Key messages emerging from the INNODRIVE project

1. GDP in the EU27 area is 5.5% higher after including all intangible investment.
2. Intangibles are an important source of future growth across European countries. Intangibles explain a substantial part of the market value of the companies that is only partially captured in standard economic analysis.
3. Countries with less tangibles invest more in intangible capital showing an indication about the degree of transition towards knowledge economy.
4. The observed decrease in tangible capital over time is not fully offset by intangible capital investment.
5. Nordic countries are R&D-intensive and have relatively less organisational capital than the UK, Belgium and the Netherlands and in company level analysis in Germany.
6. Organisational capital investment is one of the key drivers of growth, accounting for three times more investment than in R&D at national level, but also due to the narrow definition of R&D activity.
7. Intangible capital is agglomerated in metropolitan areas in the private sector: the greater Helsinki area accounts for 49% of all intangibles in Finland; the London City-Region 41% of UK intangibles. In Germany intangible capital is more dispersed, with the top-ten regions accounting for 48.3% of the German total (Munich 7.5%, Stuttgart 7.2%, Frankfurt 6.4%, Düsseldorf 5.6%, Hamburg 5.2%, Berlin 4.7%, Cologne 3.9%, Duisburg/Essen 2.8%, Nürnberg 2.7% and Karlsruhe 2.3%).
8. Foreign direct investment is an important aspect of intangible growth

in the EU8. Greenfield FDI brings with it more R&D and the companies are seen to have a higher share of organisational workers in Czech Republic.

9. Future research should focus on refining the range of production inputs, and the extent to which they should be classified as intermediate consumption or intangible investment. For example, one could incorporate the training provided by firms and address the issues of double-counting of R&D and ICT investments (database and software investments), which are often estimated in national accounting systems using employment compensation in relevant occupations.
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Reference

Corrado, C., C. Hulten and D. Sichel (2006), *Intangible Capital and Economic Growth*, NBER Working Paper No. 11948, National Bureau of Economic Research, Cambridge, MA.

Methodological and technical notes to the measurement in INNODRIVE

The company-level data collection methodology uses employee data with standardized professional occupation categories (in R&D, marketing, ICT personnel but also cultural occupations), which is collected at the firm level and National Accounts level. We have defined 41 occupational categories using ISCO (International Standard Classification of Occupations) which we used to construct a coherent set of estimates of organisational, R&D and ICT (information and communications technology) work and related intangible capital investment. Labour costs are assumed to provide a good estimate of the efforts to create these intangibles. Intangible capital estimates at the firm-level take into account the use of intermediate inputs and capital and are assessed using wages or estimated productivity. The employee data have the significant advantage of allowing us to construct data on intangibles for the service sector; we use the standard classification of industrial sectors.

INNODRIVE collects data for EU-27 countries and Norway on intangibles at the country level and for six countries at the firm level (i.e. organisations' intangible capital): Finland, Germany, Czech Republic, Norway, Slovenia and the UK.

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PROJECT IDENTITY

Coordinator	University of Vaasa (UNIVAASA), Finland
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 (the Economic Institute of the Academy of Sciences), Czech Republic➤ Libera Università Internazionale degli Studi Sociali Guido Carli (LUISS), Italy
EC contact	Marianne Paasi Marianne.Paasi@ec.europa.eu
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Budget	EC contribution: € 1.496.523
Website	www.innodrive.org
For more information	Contact: Hannu Piekkola hannu.piekkola@uwasa.fi or Mikko Lintamo mikko.lintamo@uwasa.fi