

# GLOBALINTO Final Conference, Oslo, 28-29 April 2022

## Summary

The GLOBALINTO project (“*Capturing the value of intangible assets in micro data to promote the EU's growth and competitiveness*”) develops new measures of intangible assets for use in a range of analyses at the firm, industry and macro level, with the goal of informing evidence-based policymaking concerning intangibles investments, innovation and productivity.

The final conference of the Horizon 2020 GLOBALINTO project was held on April 28 and 29 in Oslo as a hybrid event. The event included a review of key results from the project within intangibles measurement, analysis and policy, presentations by external experts and a policy panel discussion of key factors to support intangible investments and growth.

This note summarizes the main points from the conference.

## Introduction

**Thursday 28 April 2022** (Chaired by Hannu Piekkola)

*Sources of productivity growth I - Pandemic and lessons from the GLOBALINTO intangible assets survey*

Yannis Caloghirou discussed key findings from the GLOBALINTO Intangibles Assets Survey, which builds on earlier survey-based approaches and seeks to measure firms' investments in intangibles, factors influencing them and their impact on innovation and economic performance. The

survey also examines the role of relevant policies and the impact of the Covid-19 pandemic on the level of these investments. The survey was conducted among 1796 firms in seven European countries.

The implementation of the survey was however greatly challenged by the pandemic, particularly concerning data collection. The survey was designed to provide useful information for decision making across a wide range of stakeholders, including academics, statisticians, policymakers, the public and civil society.



The survey points to a number of trends concerning intangibles investment among the sample. For example:

- In-house intangible investments outweigh investments in intangibles purchased from external providers.
- Larger firms tend to have higher activity in all types of IAs. Firms operating in technology/knowledge intensive sectors also make higher investments in IAs having a higher share of in-house investments in their intangibles mix.
- In general, large countries appear to make higher expenditures than smaller countries, and particularly much higher in-house investments. Among small countries, Denmark and Finland follow the same trend.
- For the majority of firms, the Covid-19 crisis had no impact on the level of intangible spending in 2020 related to 2019 across asset types.
- The acceleration of digital transformation by Covid-19 shock is clearer in services than in manufacturing.
- Firms with investments in multiple intangibles' categories were less affected by the Covid-19 pandemic in terms of economic performance.
- Large heterogeneity of firms regarding the existence and intensity of intangible activity
  - A large share of firms (52.3%) have low expenditures (< 5% of turnover) of firms, and a smaller share of firms (20.4%) exhibit high expenditures intensity (>15% turnover).
- In-house intangible investments outweigh investments in intangibles purchased from external providers (Mean: 6.88% vs 3.85%, Median: 2% vs 1.60%)

Hannu Piekkola presented a typology of R&D activity based on the survey. The

purpose is to identify different types of R&D and to see whether these types can be identified by looking at firm performance. Four types of knowledge intensive firms are identified based on knowledge intensity and outward orientation (see the figure below). Among the main findings is that own R&D is a significant factor for growth, that new products and services during the pandemic are related to higher past growth, and that the innovative half of firms do not grow at more rapid speed than others.

New Technology	I Internal R&D R&D labor intensive	II R&D HC labor intensive	Known technology
	III R&D Absorptive capacity	IV external R&D HC labor intensive	
	Internal sourcing	External sourcing	
	Organizational boundary		

Nicholas Vonortas of George Washington University commented on the survey results. He sees the survey as an important contribution, that provides a needed resource-based view of firms' intangibles activities. While the results in themselves are interesting, they also motivate further investigation, both through more detailed regression analysis and in-depth case studies. For example, what are the sources of heterogeneity in both intangible investments and performance. Marianne Paasi, Research Associate at Technical University Berlin and GLOBALINTO Advisory Board member, commented that much research indicates that a central source of differences in performance is found in differing intangibles intensity and knowledge competences.

#### *Sources of productivity growth II - Firm and industry perspectives*

The GLOBALINTO project has developed and refined an occupation-based approach for measuring intangibles at the firm level. In addition to providing much needed measurement of intangibles at the micro level, the approach has additional applications for further analysis of

developments in the returns to intangibles. Hannu Piekkola presented methods to capture two dimensions of the impact of intangibles on productivity: innovation-biased technological change (IBTC), which measures the contribution of intangibles to technological change, and intangibles markups which measure the degree to which innovation creates markups on the costs of intangibles investments. The main results of these analyses are shown below.

Broad intangibles contribution to IBTC:

- Nordic countries are on equal footing in R&D-IBTC at around 2-2.5% per year
  - Norway has also the highest shares of intangibles employees
  - Finland and Denmark: an increase over time to highest levels
  - Slovenia has lower R&D-IBTC, at 1.3% per year
- Especially low values in knowledge intensive services (KIS)
  - Increasing role of KIS
  - Technological change 3-4.5% per year
  - KIS is linked to intangibles of manufacturing and other industries.

Markups vary across countries and follow the business cycle:

- Finland markups around 100%, dip in slow growth period 2011-2015
  - Since 2008 supported by KIS and high-tech manufacturing
- Slovenia around 90% increasing over time
  - Equal development across industry groupings
- Norway around 60%
  - High-tech decrease, Low-tech, KIS increase
- Denmark around 13%
  - High wage costs, expansion of basic services

Aggelos Tsakanikas presented results on intangibles and global value chains that indicate a strong connection between national and international knowledge creation within the manufacturing sector and the importance of co-development between manufacturing and services. Furthermore, this work shows a novel dichotomy, which provides significant insights towards a better understanding of the linkage between intangibles, innovation and sector specialization in GVCs:

- Imported intangibles have a positive link with **sector specialization**
- **Domestic intangibles** are related to **innovation**

Further policy implications based on the results are as follows:

- **Attractiveness implications;** Create motivation for FDI in local knowledge-intensive service enterprises. Create stable business environment, high-quality institutions, robust and efficient infrastructure to foster the development of healthy innovation ecosystems. Combine interventions in other policy areas; e.g. regulatory systems, intellectual property rights protection and taxation.
- **Buzz implications;** Build networking policies. Implement policy frameworks for new knowledge-intensive ventures. Consider local knowledge complimentary to foreign knowledge.
- **Connectedness implications;** Create frameworks that facilitate trade, especially for the case of knowledge production across borders. Investment into communication infrastructure and transportation infrastructure.

The database is publicly available – available on Mendeley and the GLOBALINTO website:

<https://data.mendeley.com/datasets/g9cdn9rmc2/1>

Arvid Raknerud presented results of analysis of the role of ICT capital for labour productivity. ICT is often considered to be a key driver of labour productivity growth, which is confirmed by the analysis. Their analysis utilizes the GLOBALINTO occupation-based approach for measuring intangibles, with focus on ICT capital. They find elasticities of output to ICT capital in the range of 0.10-0.15, which is both high in absolute terms and relative to tangible capital.

*Productivity puzzle, Lower productivity growth due to lower intangible investments or declining total factor productivity?*

Felix Roth presented results of recent analysis in GLOBALINTO on the impact of intangible capital on labour productivity growth across countries at the aggregate and sectoral levels by employing an econometric growth-accounting approach, using the EUKLEMS 2022 dataset.

Analysing intangibles and the market economy at different aggregation levels for the EU10 over the period 1995-2018, the analysis has produced three novel results:

First, aggregate and sectoral results suggest that intangibles play a prominent role in labour productivity growth. Intangible capital deepening accounts for around 50 percent of labour productivity growth both the aggregate and sectoral levels. In contrast to the existing studies in the literature, we find that intangible capital has a greater elasticity at the sectoral level than at the aggregate level.

Second, when we differentiate between three intangible capital dimensions, we observe that the impact of intangible capital on labour productivity growth at the aggregate and sectoral levels is largely driven by economic competencies.

Considering the fact that this type of intangibles is not included in the National Accounts, we argue that recognition of this fact would lead to a better assessment of the effects of intangible capital investment on productivity.

Third, the disaggregated analysis points towards a deep sectoral heterogeneity in the use of intangible capital. While R&D dominates intangible capital investments in the goods and manufacturing sectors, it is non-R&D intangibles such as software and organizational capital that drive intangible capital investments in market services. Furthermore, the full range of non-R&D intangibles including software, design, brand, vocational training, and organizational capital influence productivity growth more strongly in market services sector than the goods and manufacturing sectors. Considering that market services also account for the productivity gap between the EU and the US, Roth argues that our results suggest that non-R&D intangibles, here especially software, training and organizational capital, could play a critical role in explaining and closing this gap.

Alessio Mitra, Economist in the unit for Common R&I Strategy & Foresight Service at the Directorate-General for Research and Innovation, found that the holistic approach of GLOBALINTO and the focus on intangibles to be valuable for the project and the outcome of the project.

Work presented by Hannu Piekola at the micro level highlights that intangible work improves performance, ensures constant instead of decreasing returns, and generates technological change. He also noted that quality improvement of innovative work (as is measured by innovation-biased technological change) is crucial, not only the quantity, and pointed out that new innovations require organizational skills (management and marketing) and good access to markets. Work on global value

chains and how they influence knowledge flows, intangibles investments and productivity has taken on increasing importance during the pandemic, which resulted in disruptions to many global supply chains. Work by Felix Roth on the relation between intangibles and productivity has produced important results that can help inform policy, and some of these results will indeed be included in the upcoming DG RTD report on Science, Research and Innovation performance of the EU, 2022 (SRIP).

*Living in an ocean of knowledge. Leonard Nakamura, Emeritus Federal Reserve Bank of Philadelphia, GLOBALINTO Advisory Board*

Leonard Nakamura, Emeritus Federal Reserve Bank of Philadelphia and GLOBALINTO Advisory Board member, presented “Living in an ocean of knowledge”. Nakamura pointed out that we are living in a time with impressive achievements across a broad range of human endeavours, with some visible examples from firms such as Apple, Google, Tesla, SpaceX, Netflix, Spotify, Illumina, Moderna, and Amazon. Yet, our inability to measure the real value of outputs makes it difficult to measure these improvements, and in some cases we see measures of declining productivity despite what appears to be improved capabilities with important societal impact. An example is pharmaceuticals, which have developed many new innovations that have saved lives yet there has been recorded negative productivity growth in the pharmaceuticals industry in the last 15 years. This raises the question of how we deflate many innovative developments, thereby taking account of the true increases in quality and productivity. Nakamura pointed out that the nature of intangibles varies greatly from tangible investments:

- Non-rival and nonlinear—zero cost of reproduction

- IP protection (sometimes refused); open source
- No physical deterioration, no geographical ties
- Not arm’s length and very risky with fat tails
- Never the same from period to period

Nakamura argued that the evidence indicates that the prices of R&D have in many cases been deflating rapidly over time. In order to properly understand the progress in intangibles. improvements in quality and their contribution to growth, then we need to deflate intangibles.

*Measurement of intangibles and possibilities to implement them in national accounts*

Marina Rybalka presented the results of a comparison of measurements of R&D based on the GLOBALINTO approach with self-reported R&D expenditures from firms in applications for tax credits in Norway. A similar comparison could also be made with data from the R&D survey, where in both cases, the exercise is to examine how comparable self-reported R&D amounts are with estimates based on occupational data and assumptions concerning the production of intangible assets. The analysis both serves both as a valuable tool to validate the GLOBALINTO methodology and as an exploration of whether this method could be used in estimating R&D expenditures in National Accounts.

The analysis finds that aggregated measures are reasonably comparable, but that there are some large differences within selected industries and also among small companies. The most prominent cases are within knowledge intensive service sectors, which are essentially those sectors that produce and sell intangibles.

Main conclusions are that GLOBALINTO’s measure can be applied as a complementary

source to official data on R&D for analytical and statistical purposes, and that further work is needed to compare these different sources and their validity.

Pål Sletten, Head of National Accounts Unit at Statistics Norway, and Leonard Nakamura commented on the presentation. The approach was viewed as a valuable, complementary approach to current survey methods to calculate R&D expenditures, where the comparison could motivate further investigation of industries and other firm groupings (for example by firm size) with the largest difference among methods. A further point that was emphasized was to what extent firms' use of occupational classifications was consistent over time and how frequently these classifications were updated to reflect changes in job positions for individual employees.

**Friday 29 April 2022** (Chaired by Carter Bloch)

### *Regional topics on intangibles and productivity*

The first session of day 2 included presentations with a regional perspective, focusing on issues related to a selected group of countries. The first presentation was made by Tsutomu Miyagawa on productivity growth in East Asia: China, Japan and Korea. Developments in the three countries over time have followed very different paths. Among three East Asian countries (China, Japan and Korea), the Chinese economic growth rate is the highest. The movements in Korean economic growth are correlated with the Chinese economic growth, because the Korean economy is heavily dependent on the Chinese economy. The Japanese economic growth rate is the lowest in the three East Asian countries. Recently, Korean per capita GDP surpassed the Japanese per capita GDP. The R&D/GDP ratio is highest in Korea, followed by Japan,

though shares in China are increasing strongly over time. Shares of intangibles in total capital formation have typically been higher in Japan compared to Korea, but have now reached the same level in 2020.

Hannu Piekkola presented results for IBTC within knowledge intensive services in Finland, Norway, Slovenia and Denmark, for the period 2008-2019. Within R&D, rates of technological changes have increased steadily over the period, reaching around 4.0% in 2019, while rates varied around 2.5% over the period for Norway and Finland. Rates for Slovenia are somewhat lower at 1.5%. In general, rates of technological changes are lower for organisational capital. Slovenia has experienced the greatest increase in rates, reaching 1.0% at the end of the period. Rates for Norway (1.2%) and Finland (1.0%) have been more steady during the period while rates have been lower for Denmark, ending at 0.6% in 2019.

Felix Roth, Ahmed Bounfour and Alberto Nonnis presented a comparison of intangibles investment and productivity for France and Germany. They point out a large investment gap between France and Germany:

- Germany invest a lot more in R&D
- German SMEs also invest a lot more in R&D than their French counterparts
- France however invest more in manufacturing
- While Germany invest a lot more in services, which seem to drive the difference between the countries

At the same time, labour productivity growth rates are quite similar for the two countries. These results would thus appear to raise the question whether there is a measurement error in organisational capital for France. Results from the new GLOBALINTO Intangibles Survey lend some support to this argument, as these

results show much more similar investment shares for the two countries.

*Intangibles and high-growth firms - diversity in gender, education and entrepreneurs*

Carita Eklund presented the results of two analyses. The first concerned the relation between gender balance and productivity, where Eklund examines gender shares among knowledge intensive, or intangibles-producing, staff. She finds a U-shaped relation between gender shares and productivity, with productivity increasing in gender shares and reaching a maximum at around a share of 45% of women in intangibles positions, which is substantially higher than actual shares. The results suggest that there are substantial potential productivity gains from increasing gender diversity among innovative staff.

In the second study, Eklund examines the role of educational diversity for the propensity to become a gazelle among Danish firms. Educational diversity is positively related to becoming a gazelle, particularly among highly educated employees.

Antti Norkio presented the results of a study of entrepreneurial talent in driving firm growth. He finds that entrepreneurial talent of both skilled and unskilled entrepreneurs has a positive impact on high growth. High-growth firms thus appear to be dependent on innovative entrepreneurs and employees even if excluding firms without intangible capital from the study.

Alessio Mitra highlighted the interesting findings of the work of Antti Norkio and Hannu Piekkola, particularly how entrepreneurial talent has a positive impact on high-growth, both skilled and unskilled, while only skilled entrepreneurial talent positively affects growth within high-tech. Highly educated entrepreneurs are thus needed within knowledge intensive industries. Mitra further highlighted the

work of Bloch, Eklund and Van Criekingen on the importance of gender balance within top management and general diversity within top management. And how female role models are necessary too, in order to combat the gender imbalance in positions within top management.

Following the focus on skilled vs. unskilled labour, Mitra followed up by presenting the development in the percentage of EU-citizens completing tertiary studies. From 2010 to 2020 the share of the population aged 25-43, who have successfully completed tertiary studies, have increased in all of the EU-27 member states and in Norway. While the share of R&D personnel in the total labour similarly increased in all EU-27 member states but three, from 2011 to 2020. Only in Finland, Luxembourg and Malta did the share of R&D personal not increase, it should be noted that Luxembourg and Finland had the highest shares in 2011.

In relation to the gender imbalance within top management, Mitra pointed out the continuing tertiary education gender imbalance within areas such as engineering, manufacturing and construction across Europe. An imbalance that continues even though more women than men now are finishing tertiary study programs. The same imbalance is also found in the female entrepreneurship rate across the EU, here females are also still behind their male counterparts, even though they are overall more educated.

*Intangibles between the firm and the system. A Challenge for Policy*

Jakob Edler discussed the dual nature of intangibles and how this can create tensions in policy goals. Incentives for firms to invest in intangibles are very much dependent on their ability to appropriate the gains from these investments. In some cases, intangibles have a strong tacit component, making it difficult for other firms to copy or capitalize on own firm investments.

However, many other intangibles such as software are easy to copy and disseminate, making it difficult for firms to exclude competitors from benefitting from own investments. Hence, in these cases, greater protection of intangibles increases incentives to invest. At the same time, aggregated gains from new knowledge creation are dependent on the exchange and spreading of new knowledge, so new knowledge can be utilized and further built upon by other firms. Simplified, this essentially creates a potential tension between the interests of companies (appropriation and protection of IPRs) and the 'common good'.

Public policies in terms of intangibles are extensively geared towards increasing the productivity of the economy by increasing the innovative output and capabilities of the firm. Edler argued that there is no coherent policy or institutional framework for the development/deployment of intangibles as a category:

- Fragmented approach
- Neglects tensions inherent in the provision of intangibles
- Neglects interdependencies between types of intangibles and actor groups
- Limited to fiscal incentives for development and generation of intangibles

*An EU policy perspective on intangible investments, Erik Canton, Deputy Chief Economist of DG RTD*

Erik Canton, Deputy Chief Economist of the EC Directorate General for Research and Innovation, presented on the EU policy perspective on intangible investments. In order to set the stage for the role of policy, Canton discussed the current status for innovation and intangible investments in the EU. The EU currently accounts for about 20% of R&D investment in the world. While R&D investment in the EU has increased

steadily over the past 20 years, most member states still face a large challenge in reaching the 3% target for R&D investment. R&I policy needs to leverage further efforts to increase investments. In comparison with countries outside of the EU, GDP shares of public R&D in the EU are among the highest in the world, while there is on the other hand a large gap in R&D shares for private R&D. Canton also stressed the need for skills development within ICT capabilities and a wide range of other areas needed to support innovation, growth and societal needs.

The policy framework for research and innovation has broadened in the EU and elsewhere. Canton illustrated the expansion from an earlier focus on addressing traditional market failures towards systems failures among actors and institutions to a more recent and additional focus on the directionality of innovation in addressing societal goals.

Main issues for EU intangibles policy are thus the following:

- Intangible investments are too low (e.g. 3% R&D target)
- We need the right investment mix (to exploit synergies)
- Danger of a digital divide (e.g. across regions, firms, households, generations); we need to repair the diffusion machine
- Remedies
  - Enhance the skills of workers and managers
  - Direct / indirect support to R&D activity
  - High quality digital infrastructure and framework conditions

Two key programmes in EU are Horizon Europe and the Recovery and Resilience Facility (RRF). Horizon Europe is a reinforced R&I programme of €95.5 billion (of which €5.4 billion from the RRF). Horizon Europe has enhanced focus on 'Directionality' through Missions and Partnerships, and with 35% targeted for

climate action. The RRF helps the EU achieve its target of climate neutrality by 2050 and sets Europe on a path of digital transition, creating jobs and spurring growth.

*Panel discussion on support for growth policy to support emergence of new high-productivity firms*

The final session of the conference was a panel discussion on policies to promote high growth. Five panellists (Ahmed Bounfour, Hannu Piekola, Erik Canton, Tsutomu Miyagawa, Marianne Paasi) were invited to share their thoughts on an issue that they would like to highlight concerning intangibles policy.

Ahmed Bounfour argued first in broad terms that more coordination of intangibles policy was needed, perhaps through an institution that was devoted to forming a holistic approach to promoting intangibles investments and their contributions. Bounfour also stressed the need for platforms that foster the development of competences that will be in greater need in the future.

Hannu Piekola addressed the issue of how to measure intangibles in relation to high-productivity firms and productivity dispersion. He commented that investment into R&D has decreased in Finland, but that this is due to public spending decreases, which then in turn affects the private sector. In order to better analyse high-productivity firms and productivity dispersion, Piekola presented four growth factors as a tool to do just that. The four growth factors are as follows:

- GF 1: Supporting quality in sustainable growth
  - Quality of intangibles and their contents
  - Entrepreneurial innovation capacity
- GF 2: Supply of skilled labour and intangibles

- Intangibles and reallocation of resources from high- to low-productivity firms
- Productivity of skilled immigrants in high-tech and KIS
- GF 3: Internationalisation of companies and trade
  - Competition environment such as “Winner takes all”
  - Position in global value chains
- GF 4: Innovations environment that enhance new ideas
  - Linkages to knowledge-intensive services (KIS)
  - Public sector digital structures and intangible commons

Erik Canton focused his input on the structures of growth. He particularly emphasized the need for policy makers to create the right conditions for private companies in general and Gazelle companies in particular. He stated that such policies can be divided into two groups, demand side policies and supply side policies.

- Supply side: Making sure that firms have a large potential market – thus it is a good thing to have the single-market.
- Demand side: European green deal and other major EU projects, drive the demand for the services/products European companies, including green products.

Furthermore, Canton underlined how for growth to happen, companies need access to skills, as a lack of skilled personnel is the most frequent thing holding back firms. For example, many companies say that they have enough money to invest in renewable energy, but they cannot find the people to install/implement these changes. Thus, making the supply of skilled labour a bottleneck, for companies that want to both create growth and drive the important green agenda. Canton furthermore suggested the

use of small experimental policies in certain places, as a new way to find the best policies and find out in which settings they are best implemented.

Tsutomu Miyagawa elaborated on how the Japanese experience is different to that of EU countries. Miyagawa attributed a lot of the difference to what he called the “Three Low Rates” that Japan has suffered: 1) Low firm entry rate, 2) low productivity in SMEs and 3) low entrepreneurship activities. Based on these Japanese experiences, Miyagawa had two policy suggestions: The first being that governments should stop protecting established SMEs, they should instead rather change policy to promote new firms and the success of these. The second policy being that governments should create policies that encourage the financing of new innovative firms, creating more innovation this way.

Marianne Paasi posed the question “what have we learned?”, answering herself that “intangibles matter. And new policies are needed”. Paasi highlighted two areas in which societies would benefit if new policies were enacted. Firstly, the issue of diversity/gender, there is a lot of profit to be gained from diversification. Secondly, the issue with monopolization, Paasi requested action for when big firms buy new emerging firms, and for when foreign companies

### **About the GLOBALINTO project**

GLOBALINTO aims to develop and refine measures of intangibles at the micro level and amongst others as part of global value chains at the macro level and to use these measures to analyse the causes of the productivity slowdown and how productivity growth can be improved. We will work in co-operation with the National Statistical institutes towards the goal of integrating improved statistics into

sustained, official statistical production. This will also ensure that the development of new methods to measure intangibles are promptly available in innovation design and growth promoting policies.

This work will utilize a wide range of data sources (including data on firm activities, R&D and innovation, ICT, employee occupations and education, input-outputs, and primary data collection from a pilot intangibles survey) to measure intangibles in both the private and public sector. Taking into account the difficulties in measuring intangibles at the micro level based on existing data, GLOBALINTO will also develop and conduct a survey of intangible investments and digitalisation under Covid-19, with the goal of improving parameters used in measurement of intangibles.

The Globalinto project for 2019-2022 is financed by the European Commission’s Horizon 2020 programme. Partners are the University of Vaasa (coordinating institute, Finland), Aarhus University (AU), University of Hamburg, Paris-Saclay University, Statistics Norway, National Technical University of Athens (NTUA), University of Ljubljana, University of Manchester.

More information on the project can be found on the project website, [www.Globalinto.eu](http://www.Globalinto.eu)

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