Intellectual Capital, Firms' Innovation Growth and Emerging Value Spaces

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Editorial

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Over the past fifteen years, intangibles have emerged as an important source of growth and innovation. Several national and international institutions have emphasized their importance: the OECD, the European Commission, the World Bank, METI in Japan, and BNDES in Brazil, among others (Bounfour and Miyagawa, 2015). According to the OECD (OECD, 2013), knowledge-based capital accounts for 5 to 11% of GDP in most member countries, and play a greater role in productivity growth than tangible capital. At the firm level, the resource-based view (Barney, 1991; Wernerfelt, 1984) as well as the dynamic capabilities approach (Bounfour, 2003, Teece et al., 1997, Teece, 2015) highlight the heterogeneity of firms and the critical role of intangible assets for firm performance. The intellectual capital of nations and regions has been developed recently as a subject for research and action (Bounfour, 2008, 2018). More generally, the intellectual capital literature needs to be extended beyond the sphere of firms and individual organisations (Bounfour, 2009, Bounfour and Edvinsson, 2005).

However, despite this recognition, important analytical issues remain to be addressed, notably modelling the contribution of intangibles to innovation as well as to productivity growth – also in view of the low productivity growth in the EU area. Various additional questions have also emerged that are related to new forms of organizations – especially digital tools for co-operation and platforms, the critical role of data as intangible assets, and the way firms can take advantage of such 'new' assets in the design of their business models. The lack of data availability at the firm level is a key barrier to further analysis of the role of intangibles. Without micro data, we cannot distinguish between intangibles that create firm appropriable investments and intangibles commons: the pool of knowledge, skills, and competencies aggregated at a technological, industrial or geographical level (Lampel et al. 2020). The following issues are among those where we think progress still needs to be made, both at the scientific, business and policy levels.

The issue of measurement and valuation

Work on the measurement of intellectual capital has focused on broadening the conceptualization of what constitutes a capital investment, developing measures of intangibles at the macro level and, more recently, at the micro level for individual firms. Expenditure based methods developed by Corrado et al. (2005, 2009) and the related Barnes and McClure (2009) have also been influential in measuring intangibles and the effects of intangibles on economic growth at the industry and national level. In the Innodrive framework, a performance-based valuation has been also applied, where output elasticities of intangible assets are compared to their output shares to revise their value (Piekkola, 2016). Other attempts to estimate intangible assets are Cummins (2005) and Lev and Radhakrishnan (2005).

The current treatment of intangibles remains, however, partial and uncoordinated. There is a need for new methodologies and statistics with micro foundations, and the harmonization of approaches across countries in a way that can be applied in the System of National Accounts, which is one of the objectives of the Horizon 2020 Globalinto project.

Intellectual capital, value chains and innovation

The value chain runs from research and development (R&D) to prototyping, to production, demonstration, assembling parts (with their own value chains), commercialization, implementation and marketing of new products. Recent research has proposed a value chain approach to analyze the development of new products and services, and their contribution to growth. Global value chains can be distributed across different locations, with different degrees of control. Many emerging economies have developed capabilities in knowledge-intensive and high-value activities, which play a central role for productivity growth in EU and OECD countries.

Recent analysis (Nonnis et al. Forthcoming), integrates global value chains (GVC) into the intangible assets context. In fact, not only are intangibles an important driver of productivity, but they can also affect the allocation of activities in GVC, as other studies in the literature demonstrate. This research confirms that intangibles affect both GVC and productivity and that intangibles enhance productivity also indirectly through GVCs. This linkage is demonstrated with a mediation analysis, in which GVCs play a mediator role in the relation between intangibles and productivity. Put simply, in the mediation channel, intangibles affect GVCs which in turn affects productivity, causing a second round effect that is found to be as large as the direct effect. The measurement of GVC participation relies on network centrality measures obtained using trade in intermediate inputs between industries from the World Input-Output Database (WIOD).

It is expected that the ongoing Covid-19 crisis will affect the way global value chains are organized, especially in critical industries, such as pharmaceuticals.

Intellectual capital components and firm performance: delineating their complementarities

Building on the work of Topkis (1978) and Aoki (1984), Milgrom and Roberts (1995) and Brynjolfsson and Hitt (2000) paved the way for a new approach to considering intangibles within a firm, arguing that they should be considered jointly rather than separately. Specifically, they claim that intangibles are heterogeneous and combinatory in nature and should be analyzed from this perspective (Athey and Roberts, 2001; Roberts, 2004). Understanding the complementarities between intellectual capital components, for example by defining a set of bundles that are most relevant for firm performance and innovation, is an important first step (Bounfour, Miyagawa, 2015, Delbecque, Bounfour, Barreneche, 2015, Guo-Fitoussi, Bounfour, Rekik, 2019). It is also an aspect that researchers need to address further, especially in the digital context (see the debate on the J-Curve, and the complementarity of intangibles with AI as a general-purpose technology). As a minimum, technology (R&D) and organizational capital should be consider together as structural capital having wide use in various intangibles (Nerdrum and Erikson, 2001; F-Jardón and Martos, 2009). It not only covers the organization but also technology such as proprietary software systems.

Innovation growth path, data, platforms and ICT

Brynjolfsson, Rock, Syverson (2020) has presented a dynamic perspective on productivity growth where an "investment effect" of unmeasured intangibles leads to an understatement of productivity growth since only measurable costs enter the growth account. In the long run, "capital stock" effects dominate because some of the output used to pay intangible inputs will be mistakenly attributed only to observable capital. The "investment effect" seems to lead to large downward bias of productivity in the financial crisis period (see TFP calculations with and without a broad set of intangibles in Piekkola, 2018). The proposed J-curve theory is valid for all new intangibles such as AIs and platforms that require heavy implementation costs and where mismeasurement may lead to an overly optimistic view of productivity growth in times when the physical capital investment rate is decreasing or vice versa (Miyagwa, Tonoji, Ishikawa, 2019).

There is a need to better understand the role of digital innovation on productivity and economic growth (Nakamura, 2019) and nearly all of the articles in this issue incorporate ICT in the analysis. Platforms have emerged as a key organizational concept, notably due to the ubiquity of digital technologies and also a source of major control of critical intangible resources (Bounfour, Kim and Tran, 2019). Such a control calls for an extension of the competition policy approach to platforms, beyond the traditional two-sided market approach.

Intellectual capital and emerging value spaces

The valuation of intangibles should be forward looking depending on the ways firms organize their activities in the long term. There is a need to develop foresight approaches to innovation and value spaces (markets, trust and relational capital, platforms, communities) and the identification of the most suitable policy instruments given the intangibles commons: the pool of knowledge, skills, and competencies aggregated at a technological, industrial or geographical level or in any platforms. The acceluction regime (Bounfour, 2016), e.g. the fact that value is created by accelerated production with links among different value spaces (data, trust and relational capital, platforms, complements, social media, among others), has been suggested as a key concept for characterizing the emerging value spaces. To align with the fundamental requirements of such a regime, firms are requested to develop new approaches towards time and space. The core of disruptive technologies requires real time management (Paris IC15 conference presentation by El Sawy, Ryden, 2019).

The main objective of this Special Issue is to provide new insights into the measurement of intellectual capital and its contribution to innovation growth, while at the same time considering their importance in new, emerging innovation spaces. After the closing of the call, we have received 23 papers /extended abstracts (to be checked). After a first review by the Guest Editors, 10 papers were invited to the development workshop, which was held in Paris under the auspices of the World conference on Intellectual capital, co-organized by the European chair on intangibles[ii], at UNESCO, on July 11, 2019. The 10 papers were then submitted to the journal review process, and 7 of them have been selected for the special issue. Of the accepted papers four are from members of the Globalinto project: Hannu Piekkola, Felix Roth, Kristof Van Criekingen and Carita Mirjami Eklund. Therefore their papers have been primarily evaluated by external referees, or entirely as part of regular issue process for Hannu Piekkola.

The first paper is by Hannu Piekkola, "Intangibles and labor augmenting technical change". The paper seeks to consider not only intangible capital but also its quality at the level of

industry; thus capturing the common good characteristics of intangibles that promote technical change. The paper analyzes not only the productivity effects of accumulating structural capital such as research and development (R&D) and organizational capital (OC). Innovation work also produces innovation-labor-biased technical change (IBTC) and related knowledge spillovers, as part of the intangibles commons. The analysis uses a complete register-based dataset of Finnish firms for the period 1994-2014 from Statistics Finland. The OC-IBTC as well as total resources allocated to OC are relevant for productivity growth, emphasizing the role of OC in assimilating new knowledge in the industry. The R&D stock is relatively larger but R&D-IBTC is smaller than OC-IBTC. Public policy should, in addition to technology policy, account for OC and OC-IBTC and related knowledge spillovers in the industries that are most important among SMEs (low market-share-firms). The methodology follows the micro-based approach in the Globalinto project and is implementable at the firm-level, offering a way to link personnel reporting to intangible assets.

The next paper is by Felix Roth, "Revisiting intangible capital and labour productivity growth, 2000-2015: accounting for the crisis and economic recovery in the EU". In line with previous lines of research, the paper aims at reassessing the relationship between the largely unmeasured intangible capital and labour productivity growth using a carefully built large and up-to-date macro database (2000–2015), in order to generate novel econometric evidence by accounting for times of crisis (2008– 2013) and economic recovery (2014–2015). The paper underlines the importance of intangibles for labour productivity growth and stresses the necessity to incorporate all intangibles such as branding, firm-specific human capital and organizational capital into national accounting frameworks in order to correctly measure the levels of capital investment being made in European economies. Figure 4 in the paper shows that the unmeasured intangibles have also declined during the financial crises (although less than tangibles).

The third paper is by Carita Mirjami Eklund, "Why do some SME's become high-growth firms? The role of employee competences". This paper examines whether human capital of employees and other forms of intangibles explains high growth of SMEs rather than just entrepreneurial competences. The analysis of the likelihood to be at top 5% or 10% of growth (thus a high growth firm) finds human capital and organizational capital important in all cases as well as ICT and R&D with somewhat lower contributions. Based on employer–employee data from Danish registers from 2005 to 2013, the research concludes that a wide range of human and intangible capital are important in the high growth of firms.

The fourth paper by Kristof Van Criekingen on "External information sourcing and lead-time advantage in product innovation" analyses the critical role of lead-time for firms' competitive advantage for product development. Potential benefits of lead-time advantage can be conditioned by firms' internal capabilities as well as by their access to external knowledge. Based on firm level data from the Belgian part of Community Innovation Survey (CIS), the paper finds that breadth and depth of the external knowledge sourcing are positively related to lead-time advantage, though with diminishing returns. Investments in absorptive capacities (R&D) act to mitigate the decrease in returns.

The fifth paper by Wu et al. "The imitation-innovation link, external knowledge search and China's innovation system" analyses the complementarity between imitation and innovation strategies and the moderating role of external knowledge search. This research question has been considered in the context of China's economy and innovation system in the early 2000s,

especially regarding product development. Building on the supermodularity approach, the paper attests to the existence of complementarity between imitation and innovation strategies. External knowledge search is found to be the boundary condition that influences the extent to which these two strategies reinforce each other. During this period, imitation is not only a strategy that can be considered independent of innovation, but is also critical for the effectiveness of innovation itself. This complementarity is thus important to consider in the context of the Chinese strategy for catching-up and building a national innovation system.

The sixth paper by Cabrilo et al., "The role of IT practices in facilitating relational and trust capital for superior innovation performance: The case of Taiwanese companies", combines symmetric (SEM–PLS) and asymmetric (fsQCA) techniques to explore the moderating role of information technology in increasing organizational capacity for innovation performance, especially with regards to relational capital and trust capital. Using data collected from 102 publicly listed companies, the research confirms the role of IT in reinforcing the effect of internal and external relationship and trust building and also finds a positive relation of relational and trust capital to innovation performance.

The last paper by Francesco Baldi and Lenos Trigeorgis, "Valuing Human Capital Career Development: A Real Options Approach", examines how real-option approach can be used to measure and value flexible human capital (FHC). The paper illustrates an innovative application of a real options methodology to the domain of strategic human capital management (SHRM), specifically how to quantify the value of an organization's flexible HC career-development program to increase its ability to create and capture value. The paper uses a case-study approach to illustrate valuations and their use in assessing internal career development processes, which can be viewed as a multi-stage (compound) option involving various types of human capital uncertainty, human capital options, and human resource practices.

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[i] The editors of this special issue are members in EU Horizon 2020 project Globalinto (2019-2022) which seeks to measure and analyze new intangibles for European growth. At the industry-level, the project relies primarily on newly established global value chain WIOD data. At the firm level, the measurement of intangibles is based on innovation work related to management, marketing, R&D and information and communication technology (ICT) work. Globalinto builds on earlier work in the EU 7th framework projects Innodrive and Coinvest, which developed new ways to measure intangibles in a broad sense.

[ii] http://www.chairedelimmateriel.universite-paris-saclay.fr/2019/07/12/ic15-world-conference-intellectual-capital-communities/