Measured and unmeasured intangible capital in global value chains

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The ownership of economically valuable knowledge shapes the growth prospects of companies and economies. While the pivotal role of new ideas and combinations of existing knowledge has long been emphasised, the rise of global value chains (GVCs) has led to a renewed interest in knowledge-based drivers of economic performance. Intangible capital encompasses a wide range of knowledge-based assets lacking a physical embodiment (Lev, 2000). Intangibles are frequently grouped into three categories (Corrado et al., 2005): computerized information, innovative property, and economic competencies.

The role of intangible assets in value capture in GVCs has been highlighted in several case studies, starting with the seminal paper by Dedrick et al. (2010) on iPods and notebook PCs. However, at the aggregate level, it is more challenging to measure intangible capital and to study its role across countries. In this paper, we build a new dataset on returns to intangible capital in 64 countries and 36 industries over the period 2005-2015 that distinguishes between measured intangible capital (i.e. intangible assets reported in national accounts) and unmeasured intangible capital (estimated as a residual). We then compare our data with other estimates and datasets and discuss from a conceptual and empirical perspective what is captured as 'unmeasured' intangible capital.

<ins>Methodology used to estimate returns to measured and unmeasured intangible capital in GVCs</ins>

Our methodology builds on the work of Chen et al. (2017 and 2018) who calculate returns to intangible capital as a residual, i.e. the difference between gross output and 'tangible' input costs (the cost of intermediate inputs, labour and tangible capital). The difference is that we also account for four categories of intangible assets reported in national accounts that implement the 2008 SNA: R&D, mineral exploration and evaluation, computer software and databases and entertainment, literary or artistic originals. Assuming an ex-ante return to tangible capital and intangible assets in national accounts, our residual captures an unmeasured part of returns to intangible capital.

To create these estimates, we rely on OECD Inter-Country Input-Output tables that are benchmarked on countries' national accounts and harmonised across countries. For each country and industry, ICIO tables indicate gross output, final demand, intermediate consumption and value-added. Using input-output techniques as customary in GVC analyses, such tables provide a full decomposition of final demand for a given country and industry detailing the value-added contribution of all countries and industries along the value chain. The underlying data also

include information on labour compensation, taxes minus subsidies on products and production, as well as capital matrices by asset type and industry. The income of each factor is added across countries and industries to obtain the allocation of value added in upstream stages of production. To capture also the distribution stage, the trade margins that are estimated to convert purchasers' prices into basic prices are added to the output in each GVC (which is in basic prices). These trade margins correspond to value added in the distribution stage. We then make assumptions on the ex-ante rates of returns to tangible capital and measured intangible capital in order to estimate returns to unmeasured intangible capital by country, industry of final production, GVC stage and year.

Comparison with related approaches and exploration of 'unmeasured' intangible capital

We provide a rich discussion of aspects where our approach diverges from Chen et al. (2017 and 2018). Thus, we discuss the importance of taking into account the role of non-produced assets that are imperfectly captured in national accounts. Regarding returns to intangibles recorded in national accounts, we compare their share of total returns to intangibles (measured and unmeasured) across different GVCs and countries. The analysis of these patterns informs the subsequent steps aimed at exploring the constituents of the returns to unmeasured intangible capital (estimated as a residual). The discussion focuses on four main aspects: competition, economic competencies, intellectual property rights (IPRs), and multinational enterprises (MNEs).

First, we use industry-level information on mark-ups and data on antimonopoly policies to illuminate the link between returns to unmeasured capital and market structure. Second, we draw on the INTAN-Invest database (Corrado et al., 2016) to examine whether this residual is associated with economic competencies that are not recorded in the national accounts but can be inferred using alternative data, e.g. on the compensation of managers.

Third, exploiting industry-level data on the use of different IPRs and information on the quality of IPR protection, we shed light on the link between IPRs and returns to unmeasured intangible capital. Fourth, we combine our estimates of the two types of returns to intangibles with information on MNEs' share of production and employment in different industries and countries. For technologically less advanced economies, we identify patterns indicating a systematic link between stronger MNE presence and relatively higher returns to unmeasured intangible capital.

We discuss our results in light of the literature on the measurement of intangibles and propose starting points for future research.

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