The contribution of Intangible inputs and Global Value Chain participation to productivity performance - first results from the GLOBALINTO Input-Output Intangibles database

The first results relying on Input-Output (I-O) data in the GLOBALINTO project have now been completed, and the respective deliverable D6.1[i] can be found at www.globalinto.eu.

Our analysis builds on the new GLOBALINTO Input-Output Intangibles database that covers EU-28 countries over the years 2000-2014. The aim of this novel dataset is to track, year by year, the inward and outward flows of intangible intermediate inputs from/to the home economy to/from abroad alongside other relative data (i.e. exports of intermediates, productivity estimates etc). **Our goal is to link the broad concept of innovation to that of intangible inputs in production and thus, extending the classic ICT/R&D-centric approach.**

The conceptual approach

From a conceptual point of view, we adopt **a novel approach of tracking the contribution of intangible inputs along the Global Value Chain (GVC)**. This offers a different perspective on intangible assets, that can be distinguished from the stream of literature originating from Nakamura (2001)[ii] and Corrado, Hulten and Sichel (2005) [iii] that focuses on country's (or economic sectors within countries) investments in Intangible assets. The **GVC perspective focuses at the generation of added value from intangible intermediate inputs into the final production**. Thus, **the focus is shifted from yearly intangible investments** creating intangible capital stocks, **to intangible intermediate components within industrial production**.

In our analysis, the country's productivity is defined as the ratio of productivity (value added to total output) of all sectors of a country, divided by the same productivity measure for all sectors globally. This shows, year by year, how productive a country is in comparison to all other countries. The *intangible inputs* are measured with the share of intangible inputs (produced domestically and imported) over the total consumption of intermediate inputs (material, energy and services). This variable captures thus the most (and least) intensive intangible users. *GVC participation* is measured as the ratio of "value added exports" (Johnson and Noguera, 2012[iv]; Los and Timmer, 2018[v]) over gross exports, at country level. The variable accounts for the share of each EU country's VA incorporated in its exports, being a measure of the country's forward GVC participation.

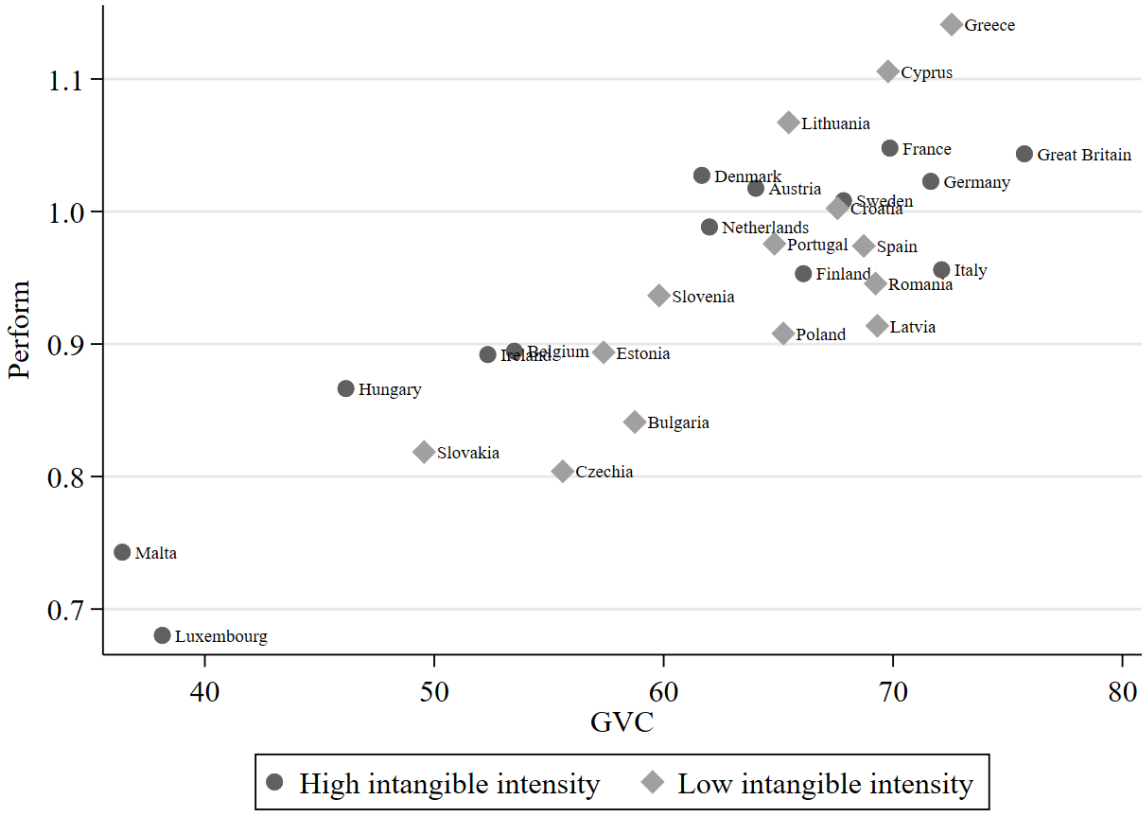
Empirical results

Results show that the largest EU economies, with the exception of France, use rather invariant levels of intangible inputs in their domestic production. Newer EU Member states such as Croatia, Estonia, Latvia, Romania and Slovakia, together with renewed intangible-intensive economies such as Ireland, Luxembourg and Finland show the most pronounced rising trends. Despite some "spikes" observed in certain cases, **the economic crisis of 2008-2013 did not change the trends of intangible inputs usage**. Regarding productivity and GVC participation, with the exception of Cyprus, Greece and Spain there is a rather high correlation between the two-time series.

Results also point **to a positive relationship between (forward) GVC participation and economic performances**. Regarding intangible intensity, on the other hand, results are mixed. Greece and Cyprus, for instance, show the highest values in the sample in economic performances and GVC participation, although they have a low intangibles intensity. Indeed, the high productivity performances of these countries may be driven by the decreasing levels of employment rather than the total production during the 2008-2013 period. Overall, it is observed that the three out of the four top-performing and top-GVC-participant countries are intangible intensive (France, Germany and Great Britain), while three out of four *laggards* in both categories have lower intangible intensity (Bulgaria, Czech Republic and Slovakia).

Figure 1

Scatterplot between domestic VA incorporated in gross exports (for direct use) and productivity performance in EU-28 countries, average of the period 2000-2014



Note: *Perform* refers to the variable "Sector productivity performance relative to sector productivity globally (all sectors estimate)", and *GVC* refers to the variable "VAX-D as a share of gross exports". Countries are differentiated between high and low intangible intensity based on their respective shares of Intangible inputs (domestic and imported) to total intermediate consumption.

Source: Authors' calculations on GLOBALINTO Input-Output Intangibles database and WIOD. See Tsakanikas et al. (2020)[vi].

Conclusions

Our analysis highlights:

- **A clear link between GVC participation and economic performance**, and evidence supporting the hypothesis that **intangible-intensive countries with high levels of GVC participation are increasing their productivity performances**.
- The countries with the highest economic performances are those defined as *headquarter economies* in Baldwin (2013) and Baldwin and Lopez-Gonzalez (2015), such as France, Germany and Great Britain. On the other hand, the least productive countries are the *factory economies* Bulgaria, Czech Republic, Hungary and Slovakia.
- The need for EU policy-makers to formulate joint policy agendas that enable the industrial transformation towards intangible-intensive, global economies that are supported by modern legislative frameworks (e.g. in intellectual property rights) and adequate levels of public investment in human capital growth (in terms of both skills and quantity).
- The need for a unified definition framework for intangibles as well as production related targets at the national level could support a better alignment of all EU-national intangibles development strategies and diffusion policies.

[i] Tsakanikas, A., Roth, F., Caliò, S., Caloghirou, Y., Dimas, P. (2020) 'The contribution of intangible inputs and participation in global value chains to productivity performance: Evidence from the EU-28, 2000-2014' (*GLOBALINTO Deliverable 6.1), Hamburg Discussion Papers in International Economics, No. 5*, University of Hamburg, Chair of International Economics, Hamburg

[ii] Nakamura, L. (2001) *What is the US Gross Investment in Intangibles? (At Least) One Trillion Dollars a Year!*: Economic Research Division, Federal Reserve Bank of Philadelphia.

[iii] Corrado, C., Hulten, C. and Sichel, D. (2005) 'Measuring Capital and Technology: An Expanded Framework', in: C. Corrado, J. Haltiwanger and D. Sichel (eds) *Measuring capital in the new Economy*: University of Chicago Press, pp. 11–46.

[iv] Johnson, R. C. and Noguera, G. (2012) 'Accounting for intermediates: Production sharing and trade in value added', *Journal of International Economics*,86(2): 224–236.

[v] Los, B. and Timmer, M. (2018) 'Measuring Bilateral Exports of Value Added: A Unified Framework', *NBER Working Papers Series*: 1–27.

[vi] Tsakanikas, A., Roth, F., Caliò, S., Caloghirou, Y., Dimas, P. (2020) 'The contribution of intangible inputs and participation in global value chains to productivity performance: Evidence from the EU-28, 2000-2014' (*GLOBALINTO Deliverable 6.1), Hamburg Discussion Papers in International Economics, No. 5*, University of Hamburg, Chair of International Economics, Hamburg