EXTENDED ABSTRACT

Title: Functional upgrading in Global Value Chains: Evidence from EU regions

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Abstract:

Literature within the fields of regional economics and economic geography traditionally focused on the concepts of "regional worlds" (Storper, 1993) and "local capabilities" (Crescenzi, 2005). Historically, this literature overlooked interregional linkages. Nevertheless, this tendency is changing, and there is an increasing interest in studying how regions interact between them, and how these interactions influence the economic performance of territories (Yeung, 2020).

Nonetheless, interregional linkages have been proved to be a broad concept. This research focuses on production interregional linkages. In the last decades, as a result of globalisation processes and offshoring, new industrial organisation forms have arisen in order to explain the new landscape of economic activities worldwide. It has been especially important the appearance of the notion of Global Value Chains (hereinafter "GVCs") (Gereffi et al., 2005). GVCs can be defined as "the full range of economic activities needed to produce a product or service from its conception to its delivery to final consumers" (De Backer et al., 2013).

This new approach to analyse production processes, based on value added data, helped to solve a traditional issue within the field of international trade: double-counting (Los et al., 2016). Products and services cross several times borders during their production processes since different production stages are distributed across different territories. Therefore, analyses based on raw trade data, measured in gross output (imports and exports) could bias the conclusions (Timmer et al., 2014). This new value added trade statistics are commonly known as “second generation trade indicators”. However, scholars in international trade are trying to improve the disaggregation of trade flows into a finer division. As a result of this effort, the “third generation of trade indicators” has been recently underlined (Timmer et al., 2019). These indicators try to account for the origin of the value added, and not just the total quantity produced. They do so by differentiating business functions within the production of value added.

Associated to these changes in the spatial distribution of economic activities, the specific functions carried out by each region are changing as well. Thus, territories producing high levels of value added are associated to R&D activities, while low value added activities are related to manufacturing (Timmer et al., 2019). Therefore, one of the main challenges for regions is to move towards higher value added activities, experimenting functional upgrading processes within the value chains (Morrison et al., 2008). In this vein, this paper develops the concept of "regional functional space". It is a network that establish the relatedness between functions developed in regional industries within the process of value added production across GVCs. It can be considered an expansion or application of the notion of product space (Hidalgo et al., 2007).

As it has been recently pointed out (Boschma, 2021), there are several research opportunities by integrating evolutionary economic geography and international trade literatures. This work specifically targets the so-called “Geography of Functions”. It implies the application of evolutionary thinking (relatedness, path dependence, lock-in, etc.) to more traditional trade issues such as the configuration and fragmentation of global production networks.

The aim of this paper is to analyse the evolution of functional specialisation patterns across GVCs for EU regions (NUTS2) over the period 2000-2010. The main goal of this research is to verify the so-called “Principle of Relatedness”. The main hypothesis is that regions will become specialised in functions related to the kind of functions that are already present in their territories. In a nutshell, related functional diversification is expected to be the norm, while unrelated diversification is expected to be the exception.

Therefore, this research matches value added data with information on business functions. The analysis relies upon a new database combining information on value added, occupations and wages. Regarding the information on value added, the interregional input-output table “EUREGIO” database is used. It includes interregional input-output flows at a NUTS2 level. This database is constructed using WIOD 2013 release as a benchmark and it contains input-output data for 249 regions (NUTS2) from 24 European countries and 16 non-EU, a rest of the world and 14 industries at NACE REV.1 classification, between the years 2000 and 2010 (Thissen et al., 2018).

However, several limitations of “EUREGIO”, such as construction assumptions, are acknowledged: homogeneity in output production technology within each industry-region pair, zero rates of substitution between inputs across industries, absence of economies of scale, IO linkages do not react to shocks and absence of capacity constraints (Prades-Illanes et al., 2020).

For the information on functions, the analysis relies on the European Union Labour Force Survey (hereinafter "EULFS") and the European Union Structure of Earnings Survey (hereinafter “EUSES”) databases. The EULFS is a "large household sample survey providing quarterly results on labour participation of people aged 15 and over as well as on persons outside the labour force" (European Commission, 2020). Thus, it is possible to differentiate several business functions, proxied by occupations (ISCO-88).

As already anticipated, this paper links information on occupations with business functions. The EULFS includes the number of workers developing specific occupations within each regional sector. However, it is not possible to directly use the number of workers in each occupation to measure functional specialisation because some functions require more people than others. For example, R&D activities are developed by smaller teams than assembling processes. To account for that issue, the paper makes use of the EUSES, which includes information on the wages associated to each occupation. Thus, the median wage for each occupation in each regional industry is obtained. Then, the number of workers is multiplied by their wage, and the overall income generated by a specific business function is computed. There are two advantages that make better to use labour data instead of capital returns. Firstly, labour income (wages) usually stays in the territories in which they are obtain, since workers usually live close to their workplaces. Secondly, it is not very clear how to match capital with business functions since the same asset can be used for different purposes. For example, ICT components can be used for marketing, management, and/or R&D goals.

The methodology applied in this work to connect functions and value added contribution follows previous work in the literature such as Timmer et al. (2019). This methodology allows us to identify how each of the considered functions contributed to the value added produced in each regional industry, measuring functional specialisation indexes. This functional specialisation indicators are computed as a revealed comparative advantage index, also known as “Balassa indexes ”, in international trade. It account for the share of value added generated by one business function in a regional industry with respect to the overall income of that business function across regions.

The configuration of EU regional specialisation in terms of functions is combined with a relatedness analysis using network techniques (Balland et al., 2019). The “Principle of Relatedness” states that two activities or products are related when their production require similar knowledge or inputs (Hidalgo et al., 2018). Thus, this framework is applied to the functions produced in regional industries to measure to what extend they are connected between them. This creates a network that, as it was already mentioned, shows the regional functional spaces of regions. This research makes possible to analyse how industrial functions within regions interact between them based on their contribution of the value added produced in a region. Here, the main indicator of

interest is the relatedness density, which is computed based on the method of co-occurrence (Hidalgo et al., 2007).

The analysis is completed with an econometric model to study the probability of experiencing regional functional upgrading GVCs processes. This paper accounts for three different kinds of functional upgrading GVCs processes: intra-sectoral, intersectoral and deepening in already existing functional specialisations. Each one of this functional upgrading takes a different variable form.

For the intra-sectoral functional upgrading, it takes the form of a dummy variable with value 1 when a region obtain a functional specialisation index higher than 1 in a different business function but in the same industry, and 0 otherwise. For intersectoral functional upgrading, it takes the form of a dummy variable with value 1 when a region obtain a functional specialisation index higher than 1 in the same or different business function but in a different industry. For deepening in an already existing functional specialisation, it takes the form of a continuous variable measured by the numerical value of the functional specialisation indexes.

Therefore, for the intra-sectoral and inter-sectoral functional upgrading GVCs processes, a Limited Dependent Variable Model (hereinafter "LDVM") is used. It takes the form of an entry model, in which the dependent variables are the dummies above-explained. In the case of the continuous variable, the identification strategy is similar but avoiding the particularities of a LDVM. In any case, the econometric analysis follows a panel data approach with regional and time fixed effects. For the two LDVMs, a linear probability model is preferred.

The main explanatory variable is, as already stated, the relatedness density computed following the method of co-occurrence (Hidalgo et al., 2007). The econometric model includes other control variables largely used in previous literature such as the GDP per capita or the population growth (Balland et al., 2019). Moreover, some specific controls are included to account for GVCs particularities such as length, participation intensity or distance to final demand. Expected results include the validation of the so-called "Principle of Relatedness". It is expected that regions become specialised in functions that are close to those in which they already have a relative comparative advantage. Unrelated functional upgrading GVCs processes are expected to be exceptional.

Finally, it is worth to underline the policy implications of this paper. Industrial policies across regions are trying to reshore economic activities that left these territories. It is crucial to acknowledge that the gains of reshoring are not in re-acquire manufacturing or assembling activities, but R&D and management ones. Moreover, in terms of economic resilience, policymakers are interested in knowing which functions are more likely to be developed in their territories, thus, making a better allocation of resources related to industrial policies.

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