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Desafíos, políticas y gobernanza de los territorios en la era post-covid

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EXTENDED ABSTRACT

Title: *Understanding the diffusion of knowledge and creativity and their impact in the innovative performance of large cities*

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Abstract:

The knowledge and creativity embodied in workers is considered an important driving force of regional development in the cultural-cognitive capitalism (Faggian and McCann, 2009; Vissers and Dankbaar, 2013). In particular, the capacity to create new ideas and to commercialize them is one of the crucial features of competitive firms and economies in advanced regions. Qualified professional and technical workers who are the main bearers of the knowledge required to achieve this (Simmie, 2003). Nevertheless, there is still a lack of evidence about the way in which the existence of skilled workers (also defined as creative or knowledge workers) translates into higher levels of innovation in the regional business fabric. This is a key issue, as innovation and economic development processes arise from human capital investments from those individuals directly related with production activities, but also from the same efforts carried out by other individuals that, in some ways, interact with the formers. In this sense, the mechanisms driving that knowledge sharing and knowledge dissemination are still (partially) unknown. Concretely, these processes have been approached from several complementary perspectives at regional and firm level.

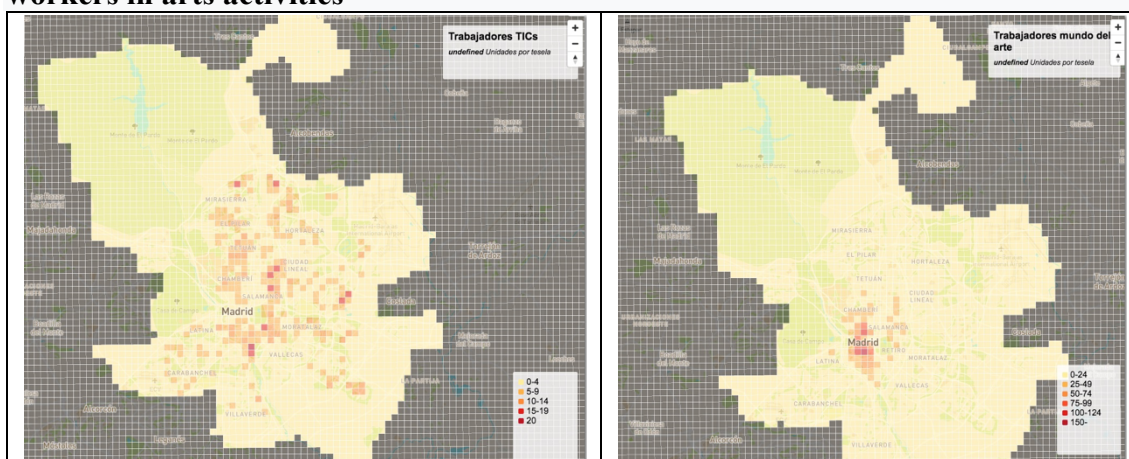
At regional level, the presence of skilled workers has been linked to regional gains of productivity, the appearance of knowledge spillovers and pecuniary externalities, among other positive effects (Florida, 2005, Shapiro, 2006, Faggian and McCann, 2009; Sánchez-Moral, et al., 2018). At intra urban level, the attention is

directed towards the urban channels of diffusion associated with the different types of knowledge. According to Asheim (2012), analytical knowledge, concerns with principles and causalities, aims to understand and explain features of the material or natural world, and it is associated with science-intensive industries. Synthetic knowledge aims to solve practical problems by combining existing knowledge and symbolic knowledge is related to the aesthetic attributes of products and the economic use of cultural artefacts, being associated with cultural and creative industries. Analytical knowledge, which can be codified efficiently, is less sensitive to geographical distance and occasional exchanges can be realized in long-distance networks (Storper and Venables, 2004). The creation of symbolic knowledge, with higher tacit component, relies heavily on frequent interactions with local people, varying its meaning across places, classes and genders (Zhao, Bentlage and Thierstein, 2017), but favoring co-agglomeration of creative industries firms based on this profile of knowledge (Coll-Martínez et al., 2019), as their success strongly relies on interactions with similar firms (Boix et al., 2015). Finally, synthetic knowledge is somehow between, as to some extent is context specific but, at the same time, knowledge exchange can be facilitated by means of information and communication technologies (Zhao, Bentlage and Thierstein, 2017).

At firm level, the literature has concentrated on interaction between firms' internal and external determinants of innovation. As for the formers, experts include mainly age, size and industry to which firms belong to (Coad et al., 2016); whilst for the later, they include mainly agglomeration economies (Puga, 2010). Although previous studies have approached the process of knowledge generation mainly as consequence of agglomeration of people, firms and institutions, there is a strand of the literature pointing to the interactive process of knowledge creation, which takes place both intra- and inter organisationally and shaped by social interaction. This became the key mechanism in the generation and spread of tacit knowledge, the most relevant for firms' success, albeit Information and Communication Technologies (ICTs) advances facilitate also its transmission (Nonaka, Toyama y Konno, 2000). As a result of all abovementioned factors, different channels of knowledge diffusion and creativity may act within the urban tissue (Spencer, 2015).

The originality of this paper is that it explores the knowledge generation and transmission, apart from the traditional focus on internal vs. external determinants, by incorporating the social interaction dimension within polycentric urban regions. Concretely, we focus on workers' interaction between the area where they work and the area where they live. This interaction is analysed using a contagion scheme, in which these workers are expected to bring knowledge inputs from their working network through their social network and vice versa. By this process, the contagion reaches working and social groups that have no common features, but that get inputs that may be transformed into new knowledge. In this sense, we assume that contagion may be fuelled by individuals' different skill level and creativity. A simulation methodology is used to determine the contagion parameters that drive the innovation process in the firms of the region. Our empirical application uses the results obtained in the project CITITALENT, where based on Social Security workers dataset that includes 2,8 million affiliated workers in the metropolitan region of Madrid (2016), we computed the density of two key groups of workers, that is, workers in knowledge intensive industries and workers in art activities, within a grid of 0,5 km cells.

Figure 1. Grid-based rendering system: workers in knowledge-based industries vs. workers in arts activities



Source: CITiTALEN project (<https://www.ucm.es/proyectocititalent/cartografia>)

Keeping in mind that previous literature does not offer enough information about the process of contagion of ideas, nor the indirect impact on the economic activity, in this work we explain the modelling strategy based on contagion model through micro-simulation. This has three specifications:

First, all individuals are considered to have a certain level of 'creativity'. Initially individuals belonging to the knowledge workers group-defined according to NACE sectors and occupations- are assigned a creativity level of 1; the same apply for the artist workers group-defined to NACE sectors. The rest are given a value of zero. Individuals spread their creativity both in workplace and place of residence. During n rounds individuals infect and are infected both at home and work.

Second, the contagion process assumes that the infection occurs randomly among people located within the same cell, and is more likely among people with similar characteristics: sectoral and occupational proximity. Unlike diseases, contagion is cumulative and comes from multiple sources. All people may be infected by each other, but the amount of creativity transmitted is always a percentage of the initial creativity level. No-creative individual may have creativity 1 after many small infections

Third, the model depends critically on several unknown parameters of contagion. We use different scenarios: from very low contagion levels (confined to knowledge workers locations) to high contagion levels, thanks to which ones entire population becomes creative for the ease of contagion. Then, standard econometric estimations are made, in which the various "creativity maps" obtained with the contagion model are used as an explanatory variable (in addition to several controls), by randomly applying different parameters. Several dependent variables may be used in order to check the robustness of the model (new firms, growth, employment...). Finally, we select optimal parameters based on the level of adjustment. Due to several maps with very different parameters offer good results, selection criterion is needed.

Finally, preliminary results are discussed as well as some policy implications for the fostering of innovation and creativity in metropolitan region of Madrid.

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