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EXTENDED ABSTRACT

Title: Population-employment dynamics in the European Union: the role of innovation.

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Abstract: (*minimum 1500 words*)

Do people follow jobs or jobs follow people? This question has been a concern in the regional science and urban economics literature for more than fifty years and, during this time, it has been linked to several debates such as whether people move primary for amenities and quality-of-life factors or for economic reasons (Paretridge, 2010), or whether employment and residential locations are exogenous (or not) of each other (De Graaff et al. 2012). Moreover, answering this question has also relevant policy implications about the best strategies to stimulate regional growth (Storper and Scott, 2009). Although some of the earliest contributions date as back as Borts and Stein (1964), Muth (1971) or Steinnes and Fisher (1974), the study by Carlino and Mills (1987) has been, by large, the most influential on the issue. Using the methodology developed by these authors, the ensuing literature has made a remarkable number of attempts to address the people-jobs causality question but, as stated in the meta-analysis of Hoogstra et al. (2017), “the controversy has only deepened since the results obtained have apparently included greater variety and become more difficult to make sense of” (Hoogstra et al., 2017, p.358). This paper aims to shed light on this controversy by

adding a new dimension on the understanding of the population – employment dynamics, this new dimension is innovation.

Parallel to the debates about “who follows who”, the geography of innovation literature has consistently shown the tendency of innovation to concentrate in the space even more than other economic activities (Audretsch and Feldman, 1996; Florida, 2005), in particular because it relies very much on knowledge exchanges that are better supported by geographical proximity (Jaffe et al., 1993). In fact, although there is not consensus (Fritsch and Wyrwich, 2021), several papers have shown that new patents are granted disproportionately in larger urban centres, thus showing increasing returns (or scaling properties) in the inventing activity with respect population size (Bettencourt et al., 2007; Balland et al., 2020). Following Fritsch and Wyrwich (2021), four main reasons have been given to explain why large cities may be more favourable places for innovation: 1) large cities tend to have a rich endowment of R&D facilities (such as universities, other public research institutes), and innovative private sector firms (‘sharing’); 2) Large cities have abundant input markets that stimulate R&D that provide a better and more productive match of inputs (‘matching’); 3) The rich endowment of R&D facilities found in large cities provide more knowledge spillovers due to the spatial proximity and cooperation of R&D actors (‘learning’). 4) Large cities may be highly attractive places for creative people, so large cities benefit from inflows of talent and new knowledge from other areas that strengthens the quality of the regional workforce there. Thus, although empirical debates remain, there are several arguments that link populations and innovation dynamics.

Additionally, although growth theories emphasize the role of innovation for long term growth (Grossman and Helpman, 1994) and, from there, we may infer a positive effect on employment, the relationship between employment and innovation is quite complex, and the distinction between product and process innovation becomes relevant. Product innovation is expected to have a positive effect on employment, because it opens the way to new or better-quality products. In employment terms, the effect depends on to what extent the production of new goods fully compensates or not the displacement of the production of old ones (Vivarelli, 2014; Calvino and Virgillitto, 2018). Process innovation, by its labour-saving nature associated to mechanization, automatization and robotization, are expected to have a negative impact on employment: labour is substituted by machines. However, there are several compensation mechanisms at work

that may reverse that effect (Vivarelli, 2014; Calvino and Virgillitto, 2018). This compensation mechanisms operate via: 1) “new machines”, 2) “decrease in prices”, 3) “new investments”, 4) “decrease in wages” and 5) “increase in incomes”. The net effect of innovation on employment will vary critically with the level of aggregation observed (Capello and Lenzi, 2013).

Thus, different streams of the literature have looked at binary relations between employment, population and innovation, but they have not been integrated yet in a dynamic adjustment model. In this paper, we aim to contribute to the literature on “who follows who” by studying how the employment (jobs) – population (people) interaction is mediated by innovation, that is how regional innovation affects the adjustment process between population and employment.

To do so, we first develop a framework to analyse the mutual effects that exists between innovation, employment and population. Then, we use the traditional system of equations of Carlino and Mills (1987) to extend it with an additional third equation that considers the regional production of innovation as part of the adjustment dynamic process.

In this study, we look at the case of NUTS2 regions from 28 European countries for the period 2000-2018. To measure innovation, we use patent data from OECD RegPat database. For population and employment data we rely on AMECO database from the European Commission. Finally, we also rely in Eurostat database for control variables such as RD expenditure or population structure.

Our preliminary results show evidence about the relationships among population, employment and innovation for the case of the European regions.

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