The Dark Side of the Geography of Innovation: 
Relatedness, Complexity, and Regional Inequality in Europe

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Abstract Extended
Since Schumpeter (1942), scholars have argued that one of the drivers of economic
development is innovation and structural change (Pasinetti 1981). Regions have to innovate
and develop new activities to compensate for processes of decline and lock-in. However,
scholars have also raised concerns that innovation may not always deliver in terms of reducing
income disparities across regions, or what has been labeled as one of the key societal challenges, that is, social inequality (Piketty 2014; Lee 2019). In fact, there are reasons to believe that innovation might even contribute to regional divergence of income levels in Europe (Iammarino et al. 2019). For instance, innovation may disproportionately benefit higher-income regions because these are well-endowed with features that are beneficial for innovation, such as human capital, diversity of activities, the best knowledge infrastructures, connectivity to centers of research excellence elsewhere, and so forth (Feldman 1994).

This dark side to the geography of innovation is not at all a new story. However, what is still missing in this narrative as well as in research on regional inequality in Europe are recent
findings on related diversification and economic complexity (Boschma 2017; Hidalgo et al. 2018). These new approaches have not yet been considered and may have the potential to shed new light on this crucial debate on regional inequality. This body of literature argues that territories tend to diversify into new activities that are close to what they have been doing in the past (Hidalgo et al. 2007). In this regard, geography scholars have built on evolutionary concepts like cumulative, collective and localized learning (Dosi et al. 1988; Camagni 1991; Antonelli 1995; Storper 1997; Boschma and Lambooy 1999; Maskell and Malmberg 1999) to argue that regions diversify into new activities related to existing activities in regions (Neffke et al. 2011). There is a large body of studies showing that this principle of relatedness indeed holds when explaining the entry of new technologies (Kogler et al. 2013; Rigby 2015), new products (Boschma et al. 2013), and new occupations (Muneepeerakul et al. 2013) in regions.

However, this relatedness and complexity literature has been rather silent on how it affects economic development of regions (Kogler 2017) and the evolution of regional inequality in particular (Hartmann et al. 2020). There is some evidence that the most complex activities tend to concentrate in the richest cities, at least in the US, and that this correlates positively with their long-run economic performance (Balland and Rigby 2017; Balland et al. 2020). Pintar and Scherngell (2020) showed for 193 metropolitan regions in Europe that knowledge complexity in a region has a positive effect on Gross Regional Product growth. Balland et al. (2019) showed that regions in Europe tend to diversify less in complex activities because hard to accomplish, unless they do so when building on related capabilities in the region. Rigby et al. (2021) showed that GDP growth and employment growth have been higher in cities in Europe that diversified into more related and more complex technologies in the period of 1981-2015. Hidalgo and Hausmann (2009) and Hausmann et al. (2014) showed that the complexity of economies is positively correlated with GDP levels of countries while Hartmann et al. (2017) showed that the complexity of economies is negatively correlated with
income inequality at the country level, and Morais et al. (2021) showed an inverted-U-shaped relationship at the regional level in Brazil. Overall, this could imply that high-income regions have a greater ability to develop new activities that are more complex, and that this potentially will also bring greater economic benefits to regions that are already the most advanced. However, systematic empirical evidence is yet lacking for European regions. Providing evidence for this would shed new light on the dark side of innovation in terms of regional inequality and provide an additional explanation for the divergence process that the spatial system in Europe is subject to an increasing extent in the last decades (Iammarino et al. 2019).

The main objective of this paper is to address this gap in the literature. We conduct an empirical analysis of 274 NUTS-2 regions and investigate their opportunities to diversify into more complex technologies and more complex industries, and how relatedness affects these diversification opportunities in the case of high-income, medium-income and low-income regions in Europe. Our findings show that there is a general tendency of highly complex regions to focus on related complex activities, and for low-complex regions to rely on related low-complex activities when diversifying. This implies that income disparities across regions in Europe are more likely to be reinforced, not reduced, due to innovation and diversification. This has important policy implications. We argue there is potential for regional innovation policy in Europe but it also runs the risk of disproportionally benefitting regions that are already advanced.