Chapter 10
Role of Universities on the Level of Regional Growth in Portugal

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ABSTRACT
Universities nowadays are considered key players in the development of entrepreneurial ecosystems and, thus, may impact regional development. This chapter analyzes the role of the university as a determinant of regional economic growth in Portuguese NUTS III regions, from 2004-2017. One-step and two-step system GMM estimation results show a statistically significant and positive impact of universities upon regional growth. Moreover, the magnitude of effects is transversely stronger in the long run, which requires the need to avoid structural breaks in public actions previously initiated in the past.

INTRODUCTION
Regions are endowed with valuable resources such as infrastructures and knowledge, which have the potential to boost the necessary conditions for the proliferation of innovation, economic growth and sustainable development (Etzkowitz & Leydesdorff 2000; Leydesdorff 2003). Recent years are characterized by increasing pressure for universities to have a more proactive role in the development process of regions (Etzkowitz & Leydesdorff 1995). Taking this overwhelming idea as the background of this study, our main goal is to analyze the role of universities as a determinant of the regional economic growth.
Covering the time period 2004-2017, this study is applied to Portuguese regions, in particular by focusing on the level III of the Nomenclature of Territorial Units for Statistical Purposes (NUTS III) administrative regions. Previous studies addressing the theme of regional growth in Portugal (Antunes & Soukiazis 2006; Crespo & Fontoura 2007; Soukiazis & Proença 2008; Crespo et al. 2009; Ramos 2009) provide valuable insights concerning the dynamics of regional growth that characterizes this economy. The present analysis not only considers universities as a determinant holding a direct effect on the regional growth, but also employs an innovative methodological approach to capture indirect effects of universities. First, the analysis is applied to a thirteen years period. Second, the generalized method of moments (GMM) estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) is adopted, which allows surpassing debilities (e.g., endogeneity) typically associated with static panel data models (e.g., pooled ordinary least squares (POLS), fixed effects (FE) and random effects (RE)). As further discussed in Section 2, overcoming debilities of the static FE model is particularly important in this case study due to the impact of universities on covariates that are also likely to have a statistically significant effect on the per capita Gross Domestic Product (GDPpc) of the respective region.

The remaining of the study is organized as follows. Section 2 presents the theoretical background. Section 3 discusses the empirical framework (i.e. data, econometric specifications and methodology). Section 4 shows empirical results. Section 5 provides a robustness check. Section 6 concludes.

THEORETICAL BACKGROUND

There is a vast literature supporting the argument that universities have a relevant role in the dynamics of regional growth (Caffrey & Isaacs 1971; Elliot et al. 1988; Benneworth & Charles 2005; Arbo & Benneworth 2007; Benneworth & Hospers 2007; Goddard & Vallance 2011, 2013; Carayannis et al. 2018; Wakkee et al. 2019).

On the one hand, universities are large economic agents with a direct impact on local economic activities (Benneworth & Charles 2005; Benneworth & Hospers 2007). At the basic level, universities act as anchor institutions of local economies by ensuring employment across a wide range of occupations and consumption of goods and services (Elliot et al. 1988; Arbo & Benneworth 2007). Moreover, universities contribute to the cultural life and natural environment of the region where they belong to (Carayannis et al. 2018).

On the other hand, universities have a direct role in the creation and accumulation of human capital (Goldin 2016; Wakkee et al. 2019). Martin (1999) concludes that the most significant positive contribution made by universities to regional innovation is attributable to university graduates. In general, there is evidence that graduates are very mobile (Faggian et al. 2007; Whisler et al. 2008). However, Haapanen and Tervo (2012) find that most university graduates do not move from the region where they carried out their higher education during 10 years after graduation. Focusing on employment conditions at 1, 3 and 5 years after graduation, Bacci et al. (2008) reveals that about 90% of Italian graduates' work in the same region where they lived and completed their higher education. Apart from their graduates, universities are also powerful institutions in terms of attracting new human resources (i.e. talented students and staff) into the respective region.