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journal homepage: [www.elsevier.com/locate/iref](http://www.elsevier.com/locate/iref)Schumpeterian creative class competition, innovation policy, and regional economic growth<sup>☆</sup>Amitrajeet A. Batabyal<sup>a</sup>, Seung Jick Yoo<sup>b,\*</sup><sup>a</sup> Department of Economics, Rochester Institute of Technology, 92 Lomb Memorial Drive, Rochester, NY, 14623-5604, USA<sup>b</sup> Graduate School of International Service, Sookmyung Women's University, 100 Cheongpa-ro 47-gil, Yongsan-gu, Seoul, Republic of Korea

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## ABSTRACT

We focus on a region that is creative in the sense of Richard Florida. The creative class is broadly composed of existing and candidate entrepreneurs. The general question we analyze concerns the effects of Schumpeterian competition between existing and candidate entrepreneurs on economic growth and innovation policy in this region. We perform four specific tasks. First, when the flow rate of innovation function for the existing entrepreneurs is strictly concave, we delineate the circumstances in which competition between existing and candidate entrepreneurs leads to a unique balanced growth path (BGP) equilibrium. Second, we examine whether it is possible for the BGP equilibrium to involve different levels of R&D expenditures by the existing entrepreneurs. Third, we show how the BGP equilibrium is altered when the flow rate of innovation function for the existing entrepreneurs is constant. Finally, we study the impact that taxes and subsidies on R&D by existing and candidate entrepreneurs have on R&D expenditures and regional economic growth.

## 1. Introduction

Regional scientists and urban economists are now very familiar with the twin notions of the *creative class* and *creative capital*. This is because of the considerable impact that Richard Florida's two tomes *The Rise of the Creative Class* in 2002 and the *Flight of the Creative Class* in 2005 have had on both academic researchers and policymakers in regions throughout the United States and Western Europe.<sup>1</sup> Florida (2002, p. 68) helpfully explains that the creative class “consists of people who add economic value through their creativity.” This class is composed of professionals such as doctors, lawyers, scientists, engineers, university professors, and, notably, bohemians such as artists, musicians, and sculptors. From the perspective of regional economic growth and development, these people are important because they possess creative capital which is the “intrinsically human ability to create new ideas, new technologies, new business models, new cultural forms, and whole new industries that really [matter]” (Florida, 2005a, p. 32).

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<sup>1</sup> Also see Florida (2005b, 2014) and Florida, Mellander, and Stolarick (2008).

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The creative class deserves to be studied in detail, says Florida, because this group of people gives rise to ideas, information, and technology, outputs that are significant for the growth and development of cities and regions. Therefore, in this era of globalization, regions that want to be successful need to do all they can to attract and retain members of the creative class because this class is the primary driver of regional economic growth.<sup>2</sup>

Several researchers have now documented the salience of the creative class in promoting regional economic growth and development. For instance, in a theoretical paper, Batabyal and Nijkamp (2013) show how the preferences of the creative class affect the properties of the so called constant growth path (CGP) equilibrium in an urban economy. Gabe, Florida, and Mellander (2013) use individual-level data from the United States (US) Current Population Surveys and show that in the 2006–2011 time period, relative to other workers, members of the creative class had a lower probability of being unemployed and that the benefit of being employed in a creative occupation rose over time.

Currid-Halkett and Stolarick (2013) complement the first finding in Gabe et al. (2013) mentioned in the preceding paragraph. Specifically, these researchers look at regional unemployment variation in the aftermath of the financial crisis in 2007–2008 and show that members of the creative class have a lower likelihood of being unemployed. From this result, these researchers conclude that although creativity definitely influences economic performance, the magnitude of this influence depends on the size of a region. Tiruneh (2014) uses Italian data and demonstrates that along with technology, the creative class in a region has a positive impact on this region's economic development.

Concentrating on Nordic nations, Tohmo (2015) points out that there is a clear positive association between the existing creative class in these nations and the birth rate of high-technology firms. Finally, in a paper that has both theoretical and empirical foci, Buettner and Janeba (2016) contend that in some settings, German cities face strong incentives to attract members of the creative class by providing these members with the appropriate amenities.

Given this review of the literature, it is now essential to emphasize three points. First, the above studies and the work of Eversole (2005), Baumol (2010), Siemiatycki (2013), and Batabyal and Nijkamp (2014) tells us that in regions where the creative class is a dominant part of the overall workforce, there is a clear link between *innovations*, the creative class, and regional economic growth and development. Second, innovative activities and processes are essentially *competitive* in nature and it is this competitive aspect that is related to the insight of Joseph Schumpeter who argued that growth processes are marked by *creative destruction* in which “economic growth is driven, at least in part, by new firms replacing incumbents and new machines and products replacing old ones” (Acemoglu, 2009, p. 458). Finally, the preceding two points notwithstanding, there are *no* theoretical studies that analyze how Schumpeterian competition between the members of a region's creative class affects either innovation policy or economic growth in this region.<sup>3</sup> Hence, in this paper, we provide the *first* theoretical analysis of the ways in which Schumpeterian creative class competition influences both innovation policy and economic growth in a region that is creative *a la* Richard Florida.<sup>4</sup>

The remainder of this paper is organized as follows. Section 2 describes our theoretical model of a creative region that is adapted from Acemoglu (2009, pp. 472–479) and Acemoglu and Cao (2015). The creative class in this region is broadly composed of existing and candidate entrepreneurs.<sup>5</sup> The key question we analyze concerns the effects of Schumpeterian competition between existing and candidate entrepreneurs for innovation policy and economic growth in this region. The engine of economic growth in our creative region is *process* innovations that lead to *quality* improvements in the inputs or machines that are used to produce a knowledge good such as a smartphone that is also the final consumption good. On the assumption that the flow rate of innovation function for the existing entrepreneurs is strictly concave, section 3 describes the circumstances in which competition between existing and candidate entrepreneurs in the creative class leads to a unique balanced growth path (BGP) equilibrium. Section 4 examines whether it is possible for the BGP equilibrium to involve *different* levels of research and development (R&D) expenditures by the existing entrepreneurs with machines of dissimilar qualities.<sup>6</sup> Section 5 shows how the BGP equilibrium is altered when the flow rate of innovation function for the existing entrepreneurs is *constant*. Section 6 studies the effect that *taxes* and *subsidies* on R&D by existing and candidate entrepreneurs have on R&D expenditures and regional economic growth. Finally, section 7 concludes and then offers two suggestions for extending the research delineated in this paper.

<sup>2</sup> Consistent with the work of Florida (2002) on talent, technology, and tolerance (the 3Ts), the formation of the creative class is likely to be stimulated in cities and regions that are *tolerant* and hence welcome diverse individuals who are both *talented* and skilled in creating and working with new *technologies*. In addition, in cities and regions where the creative class constitutes a dominant part of the overall labor force, we can expect a significant number of innovative activities that lead eventually to the provision of intellectual property rights protection (IPR). In this regard, our position is that although the creative class can reasonably be thought of as a consequence of the possession of the above mentioned 3Ts by cities and regions, this same creative class is typically not the consequence of IPR.

<sup>3</sup> The Schumpeterian competition we study is described in detail in section 2 below. Also, note that we are aware of three theoretical papers that study Schumpeterian economic growth in one or more regions. Batabyal and Nijkamp (2014) have used a Schumpeterian growth model to study the circumstances in which there is either too much or too little innovation first in a generic region and then when this region is part of an aggregate economy of  $N \geq 2$  regions. Batabyal and Beladi (2016) have analyzed the effects of probabilistic innovations on Schumpeterian economic growth in a creative region. This paper also studies whether there is too much or too little innovation in this same creative region. Batabyal and Yoo (2017) analyze the nature of R&D *per se* and the Schumpeterian economic growth that the conduct of R&D gives rise to in a creative region. Although there is some similarity between the models employed in these three papers and the model employed in our paper, we stress that there is *no* overlap between the questions analyzed in the above three papers and the issues we study in the present paper.

<sup>4</sup> The existence of this kind of competition in real world settings has been noted by several writers. For instance, if we think of “Silicon Valley” in California as our creative region and individuals who are programmers or computer engineers or applications developers as members of the creative class in this region then the work of Miller and Wortham (2011), Terdiman (2014), and Widdicombe (2014) tells us that there is fierce competition not only between these individuals but also, more generally, for their talents by headhunters and final good producers.

<sup>5</sup> In principle, it is possible for the creative class to be composed of individuals in addition to the existing and the candidate entrepreneurs.

<sup>6</sup> See Orman (2015) and Chen, Chen, and Yang (2017) for alternate perspectives on innovation and R&D.

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