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# Entrepreneurship, sectoral outputs and environmental improvement: International evidence

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## ABSTRACT

The relationship between entrepreneurship, output and environmental quality receives considerable attention from academics and policymakers, as society searches for solutions leading to environmental sustainability. Given this context, the current study contributes to this discussion by explaining how entrepreneurship and different sectoral outputs can help resolve the environmental problems of global socio-economic systems. So, we used data for 69 countries split across four homogeneous income-based panels: high-income, upper-middle-income, lower-middle-income, and low-income economies. Long-run elasticities suggest that (i) the rate of environmental damage due to the growth of sectoral outputs is much higher in the high-income sample; (ii) compared to output from other sectors, services makes the highest contribution to environmental degradation in high-income countries but its contribution in the other country samples is negative; indicating that a move to services economy would be beneficial for these countries; (iii) with the exception of the high-income sample, there is an inverted U-shaped relationship between output growth and environmental degradation across country samples and sectors; (iv) the contribution of entrepreneurial activity to environmental degradation is lower in high-income countries compared to other country samples; and (v) entrepreneurship activity in high-income countries initially degrades the environment but then improves environmental quality after a certain level, that is, an inverted U-shaped relationship between entrepreneurship and environmental pollution. The findings are sensitive to different income groups and sectoral analyzes. In particular, these empirical findings aid sound economic policymaking for improving environmental quality and sustainable economic development.

## 1. Introduction

Since the mid 1980s, environmental concerns have been considered in the design of economic policy. Natural capital is considered to be an indispensable production input, and also a determinant of societal wellbeing (Costantini and Monni, 2008). The incorporation of environmental topics in economic growth theories and empirics is beginning to receive extensive consideration in the literature, and the question of whether output growth leads to more environmental degradation has become central in discussions among both economists and environmentalists.<sup>1</sup>

Moreover, concern about whether the social–ecological processes which allow human wellbeing to be sustained suggests that sustainable development should be a broad social goal. The role of entrepreneurship in achieving such goal is emerging as a subject of some debate. It is considered as the most important channel toward production of sustainable products and services, and implementation of new projects to

address many environmental and social concerns. Several studies, such as Schumpeter (1934, 1942), Drucker (1985), and Matos and Hall (2007), among others, examine the link between resolution of global problems and entrepreneurship. For example, Cohen and Winn (2007) show that four types of market imperfection contribute to environmental pollution; they are considered as sources of significant entrepreneurial opportunity to establish the foundations for an emerging model of sustainable entrepreneurship by slowing the degradation and even gradually improving ecosystems. Similarly, York and Venkataraman (2010) propose entrepreneurship as a solution to, rather than a cause of, environmental degradation. These authors form a model that embraces the potential of entrepreneurship to supplement regulation, corporate social responsibility, and activism in resolving environmental problems. Sheperd and Patzel (2011) suggest that entrepreneurship can protect the ecosystem, improve environmental quality, reduce deforestation, and improve agricultural practices and freshwater supply. Since then, entrepreneurship could be a solution to

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<sup>1</sup> Empirical debate over output growth and environmental quality began with the study by Grossman and Krueger (1991). The empirical association between them is described as the environmental Kuznets curve (EKC) The EKC describes a relationship where in the early stage of economic development environmental degradation increases with per capita income, and after a certain level of per capita income, environmental quality increases with a rise in per capita income.

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numerous environmental and social problems (Wheeler et al., 2005; Hall et al., 2010).<sup>2</sup> Starting from these considerations, we propose an EKC model which includes entrepreneurship as an aspect of sustainability.

This article makes two main contributions to the existing literature. First, we integrate entrepreneurship in the standard environmental Kuznets (EKC) model as an aspect of sustainability in order to examine the role of entrepreneurship activity on the environmental improvement. Specifically, we demonstrate that at early stages of economic development, entrepreneurial activity increases real incomes but damages the environment because at this stage, environmental quality is considered a luxury good. However, as countries achieve a certain level of economic development, the increased income from entrepreneurial activity contributes to the environmental improvement. Second, different sectoral outputs have been integrated in this model to identify the contribution of each sector on environmental quality, and to demonstrate that this contribution depends on the stages of economic development.

The rest of the article is organized as follows: Section 2 provides a brief literature review; Section 3 describes the empirical strategy; Section 4 reports and discusses the empirical results; and Section 5 concludes with some policy implications.

## 2. Theoretical framework and hypotheses

### 2.1. Entrepreneurship and environment

Currently, small businesses and entrepreneurship are economic fundamentals, and are responsible for breakthrough innovations which influence the growth of a free market economy and its general performance (Iyigun and Keskin, 2015). Originally, entrepreneurship was defined as establishing a business using individual capital and entrepreneurs and entrepreneurial activity have existed for a long time. However, Schumpeter introduced a new notion of entrepreneurship and of entrepreneurs as “innovators, who use a process of shattering the status quo of the existing products and services to set up new products, new services” (Sahin and Asunakutlu, 2014). In this perspective, entrepreneurship can be defined as the creation of new enterprising activities such as new ventures, strategic renewal, and innovation leading to better social and economic performance from companies (Habbershon et al., 2010).

Several researchers and practitioners view entrepreneurship as a channel for sustainable development, and expect the innovative power of entrepreneurship to produce the next industrial revolution and a more sustainable future. In this view, entrepreneurship is seen more and more as a significant tool for promoting the change to sustainable products and processes (Hall et al., 2010). Cohen and Winn (2007) provide evidence that four categories of market imperfections<sup>3</sup> contribute to environmental pollution, and see this as providing opportunities for significant entrepreneurial activity, and a model of sustainable entrepreneurship based on slowing environmental degradation and progressively enhancing the earth's ecosystems. In addition, several environmentalists perceive the interconnection between business and the natural environment as a zero-sum game in which nature loses every time (Carson et al., 2003; Flannery, 2005). Similarly, Riti et al. (2015) investigate the causal relationship between entrepreneurship and the environment using a FMOLS approach for Nigeria in 2000–2012. They find that entrepreneurship has a negative impact on the environment which makes sustainable development unattainable.

However, other studies such as York and Venkataraman (2010) see

<sup>2</sup> Several prestigious journals such as *Harvard Business Review*, *Journal of Business Venturing*, and *Entrepreneurship: Theory and Practice* published special issues covering this topic.

<sup>3</sup> Inefficient firms, externalities, flawed pricing mechanisms, and information asymmetries.

entrepreneurship as a solution to rather than a cause of environmental degradation. Their model includes the potential for entrepreneurship to complement regulation, corporate social responsibility, and activism in relation to resolving environmental problems. Furthermore, according to Sheperd and Patzel (2011) entrepreneurial activity can preserve the ecosystem, counteract climate change, reduce environmental degradation and deforestation, improve agricultural practices and freshwater supply, and maintain biodiversity. In this context, the experience of developed countries shows that when countries reach a high level of economic development, the relationship between entrepreneurship and environmental damage becomes negative and takes an inverted U-shape form. So, increased entrepreneurial activity does not always increase environmental degradation. In addition, we can see that several works analyze the impact of entrepreneurial activity on environment but tend to overlook how this impact changes at different stages of development. For that reason, Acs et al. (1994) indicate that the level of entrepreneurship across country and time-specific contexts is explained mostly by the stage of economic development. Accordingly, we formulate the following hypothesis:

**Hypothesis 1.** The impact of entrepreneurship on environmental quality differs across stages of economic development.

### 2.2. Output and environment

Ecological modernization theory tries to clarify “how various institutions and social actors attempt to integrate environmental concerns into their everyday functioning, development, and relationships with others, including their relation with the natural world” (Mol et al., 2009). The theory builds upon a longstanding approach in environmental economics which recognizes that income growth contributes to environmental damage, but argues that further income growth can lead to a reduction in such problems (Grossman and Krueger, 1991). The environment is perceived as a luxury good, subject to public demand through the workings of an advanced market. During earlier stages or periods of economic development, environmental harms increase, but as development and affluence reach a certain point, the value the public places on the natural environment increases.

As already mentioned, the empirical association between growth and environmental degradation is described as EKC. Several studies such as Grossman and Krueger (1993), Ozturk and Acaravci (2010), Lau et al. (2014), and Omri et al. (2015) test the validity of the EKC hypothesis but provide mixed results. Some find an inverted U-shaped relationship between economic growth and environmental degradation (e.g., Ang, 2007), others find a linear relationship (e.g. Azomahou et al., 2006) or no relationship (e.g. Ang, 2007) between these elements. This literature suffers from an omitted variables bias problem due to use of a bivariate model (Farhani et al., 2014). Other studies include other determinants of environmental degradation such as human development (Costantini and Monni, 2008 and Gürlük, 2009), financial development (Shahbaz et al., 2013, Omri et al., 2015), and trade liberalization (Ben Youssef et al., 2016). However, these multivariate analyses also provide contrasting conclusions on the validity of the EKC hypothesis. While Halicioglu (2009) for Turkey, and Mensah (2014) for six African countries confirm the existence of an inverted U-shaped relationship between output growth and environmental pollution, others (Giovanni, 2013 for United Kingdom; Wang et al., 2013 for 150 nations) find no such evidence.

From the above, it is clear that most of the existing works focus on the impact of aggregate output on the environment but little attention is paid to the sectoral level of outputs at different stages of economic development. For the ecological modernization theory, the impact of output on environmental degradation may increase for low- to middle-income countries but eventually declines for high-income countries. As high-income countries shift toward low carbon fuels, the output elasticity of emissions is likely to decline. The theory shows also that the

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