

**The role of entrepreneurship, innovation and socioeconomic  
development on circularity rate: Empirical evidence from selected  
European countries**

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Concerns about the impact of crowded planet have emerged as an increasingly subject in academic circles and policymaking. Nowadays, there are more than 8 million people roughly nine times the estimated population at the start of industrial revolution who are looking for economic improvement (Sachs, 2015). The concept of sustainability has been received rising interest from governments, industry, academics and decision makers. Sustainable Developments Goals (SDGs) have been established at the new 2030 Agenda promoting economic, social and environmental development amid countries. Entrepreneurial and innovation actions have been increasingly recognized as important vehicles to guarantee this future sustainable development (Cullen and De Angelis, 2021; Oliveira et al., 2021). However, the impact of entrepreneurship and innovation on circularity has received limited attention in the literature, so far. An explanation of this omission can be the lack of quantitative data in macroeconomic level within countries.

While the role of entrepreneurship in achieving sustainable development remains an interesting subject of debate amid policymakers, governments and academic circles, its importance as a vehicle of circularity process is new in the economic literature. In the present study, we tried to clarify the links between entrepreneurship, innovation, socioeconomic development and circular economy for eighteen European economies over the period 2010-2019. Empirically, we first applied cross sectional dependence test and examined the stationarity of the series using panel unit root test. Secondly, we checked for a long run equilibrium relationship between the variables using panel cointegration tests. Lastly, we empirically estimated the long run mechanism using GLS, FMOLS and DOLS techniques offering important findings with regard to the circularity development process. In particular, circularity rate will increase on average by 0.28 percentage points if entrepreneurship in Europe increases by one percent whereas “dirty” entrepreneurship might have a negative impact on circularity process. A 1% increase in research and development (proxy of innovation) will increase circularity rate by 0.68 percentage points on average. Annual circularity rate will also increase by 0.85 percentage points if economic growth increases by 1%. Human development index has also a high impact on circularity process amid European economies. Overall, the present study suggests that if Europe gives opportunities for greater entrepreneurship, higher level of innovation, and a more equal and fair socioeconomic development among countries, will also lead to a faster process to achieving its sustainability goals.

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Key findings from the long run estimation reveal that entrepreneurship positively affects circularity rate among European economies validating that entrepreneurship in developed countries consists of an important contributor of the sustainable development system. On the contrary, the effect of “dirty” entrepreneurship proxied by the total gas emissions per capita in our empirical analysis seems to be negative as expected. Second, our findings confirm that income per capita has a highly significant and positive affiliation respectively with circularity rate confirming that richer economies circulate materials in a higher level than less income developed countries. Similarly, human development index that is used as an alternative variable of income per capita in our analysis, is also evidenced to enhance circularity rate confirming that not only economic growth but also and maybe more importantly socioeconomic development can be a contributor of sustainability among countries. In addition, technological innovation was found to highly promote sustainability process via a higher level of circularity rate in Europe. Financial development proxied by foreign direct investment seems to insignificantly affects circularity in Europe.

Our empirical findings could give ample room for crucial policy suggestions related to the achievement of higher circularity rate in Europe. Greater entrepreneurship and innovation activities would improve materials circularity rates in Europe. Despite these findings, empirical inferences should be interpreted with caution. First, empirical investigation was based on a short period of time (2010-2019) that is also characterized from an unprecedented financial crisis at the developed economies. Also, our analysis examines the direct impact of entrepreneurship, innovation and socioeconomic development only on one indicator of circularity process, the circularity rate but may other micro, meso or macro indicators of circularity could be taken into account in the future research studies.

**References**

- Cullen, U.A. and De Angelis, R., 2021. Circular entrepreneurship: A business model perspective. *Resources, Conservation and Recycling*, 168, p.105300.
- Oliveira, M., Miguel, M., van Langen, S.K., Ncube, A., Zucaro, A., Fiorentino, G., Passaro, R., Santagata, R., Coleman, N., Lowe, B.H. and Ulgiati, S., 2021. Circular Economy and the Transition to a Sustainable Society: Integrated Assessment Methods for a New Paradigm. *Circular Economy and Sustainability*, pp.1-15.
- Sachs, J.D., 2015. *The age of sustainable development*. Columbia University Press.