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Does the entrepreneurial activity enhance the national innovative capacity?

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Abstract

Innovation and entrepreneurship represent two important pillars of the economic growth. However, the analysis of their interaction is scarce in the literature. This paper considers the role of entrepreneurial activity in strengthening the national innovative capacity. While the innovative capacity is assessed based on the Global Innovation Index, the entrepreneurial activity is measured using the Global Entrepreneurship Monitor data. We conduct a panel data analysis for 34 developed and developing countries, for the period 2009-2012. Our results show that the overall entrepreneurial activity does not influence the national innovative capacity, either its output component. However, the role of opportunity-driven entrepreneurs is positive and very significant in enhancing innovation, in both cases. The findings confirm the theoretical hypothesis and contribute to the literature of innovation’s determinants, highlighting the role of entrepreneurship at macro-level.

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Keywords: Innovation determinants; Entrepreneurship; Innovative capacity; GEM data; Panel data analysis.

1. Introduction

The concepts of innovation and entrepreneurship were linked for the first time by Schumpeter (1934). In its “Theory of Economic Development”, Schumpeter shows that entrepreneurial innovations conduct to an economic equilibrium and lead to a process of creative destruction. Consequently, firms that do not adopt the new technologies disappear. More recently, Drucker (1985) affirmed that “innovation is the specific instrument of entrepreneurship”.

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Indeed, the theoretical link between innovation and entrepreneurship seems to be strong and bidirectional. However, the entrepreneurship and innovation literature focused on their role on supporting economic growth (Acs & Audretsch, 1988; Baumol, 1990; Audretsch & Thurik, 2001; Wong et al., 2005; Anokhin & Schulze, 2009), leaving aside their interaction. The role of entrepreneurship in reinforcing innovative activity is not well highlighted, either by the literature of innovation determinants, or by the entrepreneurship literature. Nevertheless, an important amount of studies consider the role of firm size in assessing the innovative output (De Mel et al, 2009; García et al., 2013). Accordingly, two theories emerged. The first one states that larger firms tend to possess sufficient resources to develop new technologies and are therefore in a better position to innovate. Thus, most of empirical papers considering the firm size in explaining innovation find a positive relationship between these concepts. The second theory, drawing on the entrepreneurship literature, considers that small firms are in a better position to innovate. Consistent with such an interpretation, Miller (1983) shows that entrepreneurial firms engage in product market innovation, undertake risky ventures and are first to come up with “proactive” innovations. At the same line, Lumpkin & Dess (1996) consider that innovativeness represents one of the features of entrepreneurial firms. A reconciliation of these two theories is obtained by McKenzie & Woodruff (2009). They had discovered that process innovation increases with firm size while small firms perform better in product innovation.

Despite the extensive theoretical research regarding the innovation and entrepreneurship, we understand relatively little about the role of entrepreneurship in enhancing firms’ innovativeness, defined by Dess et al. (2005) as “a willingness to introduce newness and novelty through experimentation and creative processes aimed at developing new products and services, as well as new processes”. Moreover, we know relatively little about the entrepreneurial – innovative activities at macro-level, especially in case of developing countries. In our opinion, these are due to a narrow definition of measurement instruments for innovation and entrepreneurship. As [8] show, despite the central role of entrepreneurs in the innovation process, data limitations have restricted standard analysis of the determinants of innovation to consider the entrepreneur.

On the one hand, the results of innovations were for a long time associated with patent applications. A patent is a right granted to the inventor for a given period of time that allows just him/her to exploit commercial revenues deriving from the application of his/her own invention (Crespi, 2004). Even if their role in assessing the innovation results is conclusive (Griliches, 1990), patents do not express the innovativeness (related to both inputs and outputs of the innovation process) and thus, their association with the innovation process results is not appropriate in case of small firms. Small firms are confronted with a huge amount of barriers related to patent application (know-how, financial constraints, etc.). Moreover, in case of developing economies, there is no culture for patent applications.

As an alternative, Furman et al. (2002) have introduced the concept of national innovative capacity (NIE), which is defined as “an economy’s potential – as both an economic and political entity – to produce a stream of commercially relevant innovations”. As Griffiths & Kickul (2008) show, this approach clarifies previous assumptions regarding what is both an input and outgrowth of such activity – innovation. The framework of NIE integrated several perspectives regarding the sources of innovation at national level and represented a starting point for the Global Innovation Index (GII) construction, calculated at present by the World Intellectual Property Organization (WIPO) in collaboration with other institutions. GII represents thus an exhaustive measure of innovation capacity (Section 3 describes its conceptual framework), which can be seen as a reliable measurement of the multilevel nature of innovation, as presented by Sears & Baba (2011).

On the other hand, as Wong et al. (2005) argue, the role of the entrepreneurship and the formalization of its measurement for empirical modeling are problematic because there is no accepted definition of what an entrepreneur means. Usually entrepreneurship is associated with the new firm creation. However, this definition does not include the reasons which determine a person to become entrepreneur. Consequently, the typology of entrepreneurs is also important in entrepreneurial studies (Gallardo & Scammahorn, 2011). The work of the Global Entrepreneurship Monitor (GEM) potentially closes this gap by providing new empirical data on entrepreneurship, making the distinction between necessity-driven entrepreneurs (NDE) and opportunity or innovation-driven entrepreneurs (ODE). In addition, the data provided by the GEM for the total entrepreneurial activity (TEA), include persons who are in the process of starting or are already running new businesses.

Based on the research context described above, our paper expands the innovation – entrepreneurship literature in several ways. First, based on a panel data for 34 countries, we test for the macro-level role of entrepreneurship in the innovation process. Second, in order to assess the innovation and the entrepreneurial activity, our approach is based
on the WIPO and GEM methodology respectively. Moreover, our empirical analysis relies both on the global innovation index and on output results of innovation – a component of the GII. Doing so, we are able to see if the entrepreneurial activity influences both the input and output of the innovation activity or only the output. Third, we test for the role of total entrepreneurial activity, but also for the role of opportunity-driven entrepreneurs. Finally, our paper contributes to the literature considering both developed and developing countries, proposing a macro-level approach. As Wong et al. (2005) state, when business creation activities and innovation activities are aggregated to the national level, there is not likely to be substantive overlap between the two constructs.

The paper proceeds as follows. In the next section we review the literature on the impact of entrepreneurship on innovation and we generate the hypotheses of the research. We subsequently describe the conceptual framework for assessing the innovation and entrepreneurial process, the data and the methodology. We then present the empirical findings. The final section discusses the results and concludes.

2. Short review of the literature and research hypotheses

In this section we provide a synopsis of the determinants of innovation literature at macroeconomic level, with an accent on the role of entrepreneurship. The study of innovation is an increasing field of economic enquiry because innovation is considered a major engine of economic growth (Crespi, 2004). Consequently, identifying the determinants of the innovation process at macroeconomic level is essential.

First of all, governments’ policies conceived to support innovation process stand for a major category of determinants. In this line, R&D expenditures represent one of the key elements of innovation activities and are an important source of productivity growth. Many governments increase their economic and policy commitments to innovation, enhancing the levels of R&D expenditures of their countries.

Second, there are demand considerations when the innovation process is analysed. The presence of a strong local demand deriving from related firms and the possibility to establish sustainable relationships with customers is essential. Customers can provide reliable feedback which represents an important source of information that can be used to derive new ideas for innovation. Gerosky and Walters (1995) empirically tested the relationship between demand and innovation and reported a positive influence. Using a VAR methodology, they found that demand Granger-cause the innovation. According to the authors, markets have a limited ability to absorb new products in a given period. Consequently, in boom periods, when the demand increases, the absorption capacity tends to grow making the introduction of innovation more profitable.

Third, the role of foreign direct investments (FDI) was questioned in association with demand but also with supply factors. In fact, the FDI can have both a positive and a negative influence on the domestic innovative capacity. On the one hand, a positive influence can appear because domestic firms may seek to exploit niche opportunities within sectors neglected by foreign-owned firms and became thus more innovative. In addition, an increased competition positively influences the innovation process in the marketing domain, in order to satisfy customers through the introduction of more appealing alternatives. On the other hand, a negative impact can be expected when FDI are oriented to small value added activities. Thus, the literature findings regarding this factor of influence are mixed. Testing for the role of FDI in explaining innovation in Spain, García et al. (2013) discovered that FDI inflows are negatively associated with the ex-post innovation, contrary to most of the findings in the literature.

Fourth, the quality of the human capital acts as a major driver of innovative activities. Hence, the role of education cannot be neglected (Gavenda et al., 2013). In models explaining the innovation determinants, the human capital is usually represented by the level of schooling and by the skills and competencies of a given population. If Lucas (1988) argues that investments in human capital produce positive externalities that enhance the economic system’s productivity and foster its growth’s rate, more recently, Acemoglu & Zilibotti (2001) found that a country with less skilled workers would have greater difficulties in implementing effectively technologies belonging to the innovation possibilities frontier, because of the derived lack of absorptive capacity.

Finally and very important, the Schumpeterian tradition has coupled the concepts of entrepreneurship and innovation. In much of the papers linking technological innovation to economic growth, the role of entrepreneurship is implicit as an underlying cause of innovation (Wong et al., 2005). We must argue that entrepreneurship is as
important in small and medium-sized enterprises as in large companies. Therefore, the role of the entrepreneurs is crucial in creating new economic activities that help to generate wealth, jobs and growth (Soriano & Huarrng, 2013).

However, as in Klyver et al. (2012), our focus is on the innovativeness of entrepreneurial activity. Therefore, the main question of our paper is: Does the entrepreneurial activity increase innovativeness during the start-up process? And we argue that the answer is related to the way of assessing the innovation and the entrepreneurial activities. First, as Gallardo & Scammahorn (2011) state, it is very important to distinguish between innovative and non-innovative entrepreneurs. Second, it is important to make the difference between innovation inputs and outputs. Therefore, we based our research on the WIPO and respectively GEM methodologies, described in the next section, in order to assess the innovativeness and entrepreneurial characteristics of a nation.

It is difficult to anticipate the impact of the entrepreneurial activity on the innovation process. Even if the two concepts are linked, some scholars argue that the innovation process is fostered by big and not by small companies. Consequently, the small entrepreneurial companies do not have the capacity to innovate. However, despite the fact that the entrepreneurship is usually associated to start-up companies, it can be experienced also in large corporations. The term corporate entrepreneurship refers to entrepreneurial activity within corporations, whereby individuals develop new ideas which are subsequently converted into products and processes. That is why it is difficult to anticipate the role of entrepreneurship in innovation, without making a distinction between categories of innovations and types of entrepreneurs. In our analysis the entrepreneurship is linked to the start-up process. Therefore, its contributions to the innovation process are not easily estimated. Accordingly:

\[ H1: \text{The total entrepreneurial activity can have either a positive or a negative impact on the national level of innovation.} \]

The distinction between necessity- and innovation-driven entrepreneurs is crucial in this case. Not all categories of entrepreneurs have the ability to innovate. The necessity entrepreneurs had no option for working in companies or have recently lost their jobs, trying thus to find a source of revenue. They frequently do not have consistent qualifications and significant financial resources for starting a business and it is hard to associate them with the innovation process. At the opposite side, we find the opportunity entrepreneurs who expect higher revenues and recognition when starting a business. They can be either competitors for big companies in case of marketing strategies for example (especially when we refer to multinational companies which are not familiar with the local culture), or partners of big companies, innovating in a specific field. This particular emphasis is theoretically appealing because the opportunity or innovations-drivers entrepreneurs get involved into entrepreneurship because they identify an opportunity and they have thus a positive impact on the innovation process. Therefore:

\[ H2: \text{Innovation-driven entrepreneurs have a positive impact on the national level of innovation.} \]

In the same time, it is essential to understand what the innovativeness process stands for. It can be associated both with innovation inputs and outputs. Innovation inputs are connected with the institutional quality, education and human capital but also with the infrastructure which sustains and favours the innovation. Nevertheless, a priori the entrepreneurs hardly contribute to the innovation inputs. They could be organized in alliances which can be involved in public strategies or educational programs and indirectly sustain the national innovativeness system. On the contrary, the impact of entrepreneurship on the output zone of the innovation process is easier to identify. The knowledge creation and particularly the knowledge diffusion are amplified by the entrepreneurial activities. In the same time, the opportunity entrepreneurs are involved in the production of creative goods and services. Therefore, the impact of the total entrepreneurial activity and of the opportunity entrepreneurs on innovation outputs is heightened as compared to the previous cases. Accordingly:

\[ H3: \text{The total entrepreneurial activity can have either a positive or a negative impact on the innovation output, which is stronger than in case of the global innovation index.} \]

and

\[ H4: \text{Innovation-driven entrepreneurs have a strong positive impact on the outputs of the national level of innovation.} \]

Indubitable, the most common innovations in smaller firms are marketing and product innovations which are mainly innovations new to the firm, not to the country. However, these innovations represent a relevant contribution to the national innovativeness level.
3. Description of variables and econometric methodology

3.1. Conceptual framework and data analysis

The innovation process is commonly assessed based on the number of patents or patents applications as innovation outputs (Anokhin & Schulze, 2009) or by the R&D expenditure, standing for innovation inputs. Yet, the small firms do not have the capacity to apply for patents, neither the interest to do so, as they are not involved in large scale production. That is why, a broad measure of innovativeness, as the GII is more appropriate in relation with the entrepreneurial activity. The GII project was launched by INSEAD in 2007 with the simple goal of determining how to find metrics and approaches to better capture the richness of innovation in society (WIPO, 2012). Immediately after, Cornell University and WIPO became partners of the project.

There are several similarities between GII and the well-known European Innovation Scoreboard (EIS). As Griffiths and Kickul (2008) state, the EIS is based on a large number of indicators used to measure innovation performance, categorized along five groups and split into two main themes: inputs and outputs. The GII is constructed in the same spirit and realises a classification of countries depending on their innovativeness level. The general framework of the index is presented in Fig. 1 below (more information can be found in WIPO, 2012).

The data regarding the entrepreneurial activity in this study are extracted from the Global Entrepreneurship Monitor which uses survey methods to estimate levels of entrepreneurial activity around the world. The GEM survey includes at present more than 198,000 people from 69 developed and emerging economies. The GEM data became quite popular in entrepreneurship analysis (see Klyver et al., 2012; Bergmann et al., 2013) because they rely on a considerable number of countries and meaningful interpretations of entrepreneurship (activity and intentions). The entrepreneurial activity is mainly assessed through the total entrepreneurial activity which represents the percentage of individuals in the nation, aged between 18 and 64, that are actively engaged in starting or managing a new business. As specified above, the GEM makes also a distinction between necessity- and opportunity-driven entrepreneurs.

Our dependent variables are represented by the GII and by the global innovation outputs index (GIOI). The explanatory variables of interest are represented by entrepreneurship assessments (TEA and ODE). In addition, we include in our empirical analysis two control variables, namely the GDP per capita and the level of the countries’ exports. The number of control variables is reduced here because the dependent variable is a composite index covering a large number of indicators which characterise the innovation (including the R&D expenditures).

![Framework of the Global Innovation Index 2012](source: WIPO (2012))
We construct a 34 countries panel for the period 2009-2012 (136 observations). We have retained in the sample only countries for which complete datasets are available (however, where annual data were missing for the entrepreneurial activity – in case of several European countries – we have used the linear interpolation to complete the sample). The countries retained in the analysis are: Argentina, Belgium, Bosnia and Herzegovina, Brazil, Chile, Colombia, Croatia, Denmark, Ecuador, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Korea Rep., Latvia, Netherlands, Norway, Peru, Portugal, Romania, Russia, Slovenia, Spain, Sweden, Switzerland, Turkey, Uruguay, United Kingdom and United States. The description of the variables is presented in Table 1.

Table 1. Descriptive statistics

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Mean</th>
<th>S.D.</th>
<th>Min.</th>
<th>Max.</th>
<th>Exp. sign</th>
<th>Definition and description</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) GII</td>
<td>50.04</td>
<td>11.52</td>
<td>28.5</td>
<td>75.43</td>
<td></td>
<td>Global innovation index, which takes values form 0 to 100, where zero is associated with a reduced level of innovativeness.</td>
<td>WIPO</td>
</tr>
<tr>
<td>(2) GIOI</td>
<td>42.59</td>
<td>10.98</td>
<td>19.58</td>
<td>69.14</td>
<td></td>
<td>Global innovation outputs index, represents the results of the innovation process, in terms of knowledge and creativity. It takes values from 0 to 100 and stands for a sub-index of the GII.</td>
<td>WIPO</td>
</tr>
<tr>
<td>Explanatory variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) TEA</td>
<td>8.72</td>
<td>5.59</td>
<td>2.4</td>
<td>27.2</td>
<td>+/-</td>
<td>Total early-stage entrepreneurial activity, which consists of the percentage of individuals, aged between 18–64 years, who are in the process of starting or are already running new businesses.</td>
<td>GEM</td>
</tr>
<tr>
<td>(4) ODE</td>
<td>49.76</td>
<td>12.27</td>
<td>10</td>
<td>74.67</td>
<td>+</td>
<td>Opportunity-driven entrepreneurs, represent the percentage of entrepreneurs who get involved into entrepreneurship because they recognize an opportunity that can improve or maintain their income or increase their independence.</td>
<td>GEM</td>
</tr>
<tr>
<td>(5) GDPC</td>
<td>9.97</td>
<td>0.85</td>
<td>8.2</td>
<td>11.5</td>
<td>+</td>
<td>GDP per capita, expressed in natural log. A positive sign is expected because the national innovative capacity increases with the development level of a country. These countries are those which dispose of important inputs for innovation, but also those which have the most important results in terms of knowledge and creativity.</td>
<td>UNCTAD</td>
</tr>
<tr>
<td>(6) EXP</td>
<td>11.86</td>
<td>1.43</td>
<td>8.58</td>
<td>14.56</td>
<td>+</td>
<td>Exports level, expressed in natural log. National firms which innovate are competitive on the international markets. Thus, a positive relationship can be expected between exports and innovativeness.</td>
<td>UNCTAD</td>
</tr>
</tbody>
</table>

Even if we test for the entrepreneurship role in improving the national innovativeness level, we are aware that the innovation process is also important for the entrepreneurial activity. The innovation inputs also stimulate the entrepreneurial activity. A variety of innovation practices, processes and outcomes assist entrepreneurial firms to increase their overall effectiveness and performance (Griffiths & Kickul, 2008). As Klyver et al. (2012) show, at individual level, researchers have demonstrated that innovation and growth affect the entrepreneurial performance. These results can also be extrapolated at national level.

Therefore, in order to avoid the reverse-causality problems in panel data, we have used the first lag for all our explanatory variables. Despite this adjustment, the correlation level of our variables is still high (Table 2).

Table 2. Correlation matrix

<table>
<thead>
<tr>
<th>Correlation</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) GII</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) GIOI</td>
<td>0.973</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) TEA</td>
<td>-0.522</td>
<td>-0.510</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) ODE</td>
<td>0.592</td>
<td>0.593</td>
<td>-0.222</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) GDPC</td>
<td>0.832</td>
<td>0.827</td>
<td>-0.622</td>
<td>0.619</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>(6) EXP</td>
<td>0.615</td>
<td>0.650</td>
<td>-0.401</td>
<td>0.338</td>
<td>0.661</td>
<td>1.00</td>
</tr>
</tbody>
</table>
3.2. Methodology

The main advantage of panel data is that such data can be used to solve an omitted variables problem. Due to data transformation (linear interpolation for missing data), we have obtained an unbroken panel data which allows us to use a simple OLS estimator. However, our panel is unbalanced because we have a large N and small T case. Therefore we proceed in the next step to test for panel random effects. The final choice between OLS (Eq. 1) and random effects results (Eq. 2) is made based on the Breusch–Pagan test.

\[
y_{it} = \beta_0 + \beta_1 x_{it} + u_{it} \quad (1)
\]
\[
y_{it} = \beta_0 + \beta_1 x_{it} + v_{i} + \varepsilon_{it} \quad (2)
\]

where: \(v_{i}\) are random effects.

Before proceeding to econometric tests, we look for the panel data stationarity. The results of the stationarity tests are presented in Table 3 and confirm the stationarity of the data.

Table 3. Stationarity tests

<table>
<thead>
<tr>
<th>Tests</th>
<th>GII</th>
<th>GIOI</th>
<th>TEA</th>
<th>ODE</th>
<th>GDPC</th>
<th>EXP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harris–Tzavalis (1999) – rho (z statistics)</td>
<td>-2.03**</td>
<td>-3.56***</td>
<td>-4.33***</td>
<td>-6.48***</td>
<td>-1.94**</td>
<td>-6.45***</td>
</tr>
<tr>
<td>Breitung (2000) – lambda (statistics)</td>
<td>-1.77**</td>
<td>-1.44*</td>
<td>-0.57</td>
<td>-1.75**</td>
<td>-1.27</td>
<td>-3.96***</td>
</tr>
<tr>
<td>Hadri (2000) – z (statistics)</td>
<td>-3.27***</td>
<td>-2.69***</td>
<td>-1.83**</td>
<td>-2.16**</td>
<td>-1.91**</td>
<td>-1.90**</td>
</tr>
</tbody>
</table>

*, **, *** mean stationarity significant at 10%, 5% et 1%.
Notes: (i) While for Harris–Tzavalis and Breitung tests the null hypothesis is that all the panels contain a unit root, the Hadri test as the null hypothesis that all the panels are (trend) stationary; (ii) For Hadri (2000) test, the stationarity was achieved with time trend (GII, GIOI, TEA, ODE) or with time trend and subtracted cross-sectional means (GDPC, EXP).

4. Empirical results

All four hypotheses described in Section 2 above were tested. For all estimations the Breusch–Pagan test indicates that the random effects model performs better. The control variables are significant and have the expected sign.

Table 4. Tests results

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>H1 – GII Dependent variable</th>
<th>H2 – GII Dependent variable</th>
<th>H3 – GIOI Dependent variable</th>
<th>H4 – GIOI Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
<td>Random</td>
<td>OLS</td>
<td>Random</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>-61.47***</td>
<td>-48.21***</td>
<td>-57.44***</td>
<td>-51.82***</td>
</tr>
<tr>
<td>TEA</td>
<td>-0.02</td>
<td>-0.18</td>
<td>0.13**</td>
<td>0.14**</td>
</tr>
<tr>
<td>ODE</td>
<td>10.00***</td>
<td>9.04***</td>
<td>8.85***</td>
<td>8.34***</td>
</tr>
<tr>
<td>GDPC</td>
<td>0.92*</td>
<td>0.81</td>
<td>1.06***</td>
<td>0.95</td>
</tr>
<tr>
<td>EXP</td>
<td>0.70</td>
<td>0.69</td>
<td>0.71</td>
<td>0.71</td>
</tr>
<tr>
<td>R²</td>
<td>0.70</td>
<td>0.69</td>
<td>0.71</td>
<td>0.71</td>
</tr>
<tr>
<td>Breusch–Pagan (recommended)</td>
<td>chi2(1) = 15.37</td>
<td>Prob &gt; chi2 = 0.00</td>
<td>chi2(1) = 15.57</td>
<td>Prob &gt; chi2 = 0.00</td>
</tr>
</tbody>
</table>

Note: *, ** and *** mean statistic relationship significant at 10%, 5%, respectively 1%.
The first hypothesis of the study states that the TEA can have either a positive or a negative impact on the national level of innovation. The positive impact appears if the innovation-driven entrepreneurs are predominant. In addition, a positive sign is expected if the small firms contribute more than the big companies to the national innovativeness level. Our results indicate a negative sign, which means that the overall entrepreneurial activity does not stimulate national innovativeness environment. This can happen when the innovation level is reduced and when small companies represent strong competitors in the market, even if they do not innovate. However, even if the sign is negative, the coefficient is not significant. The same situation is found in case of the third hypothesis, which assumes that the impact of TEA on the innovation output is stronger than in case of GII.

The second hypothesis affirmed that the impact of the innovation-driven entrepreneurs on the national innovative capacity is positive. The results presented in the Table 4 above confirm this hypothesis. The innovation-driven entrepreneurs positively influence the GII. Even if small, the coefficient is very significant. The fourth hypothesis can be considered as a robustness check for H2. Nevertheless, H4 considers that the impact of ODE on the innovation outputs should be more important that in case of both inputs and outputs (GII’s components). As coefficients are comparable, this hypothesis is not confirmed by the econometric results.

All in all, we have discovered that TEA has no impact, either on the global innovation index or on the output index. On the contrary, the ODE positively influences both the GII and GIOI. This means that the innovative entrepreneurial activity stimulates not only the innovation outputs (knowledge and creativity), but also the inputs, represented by the quality of institutions, infrastructure and human capital.

5. Conclusions

This paper intended to estimate the interaction between two related concepts: innovation and entrepreneurship. Even if these two processes were assessed in relation with the economic growth theory, the studies analysing their interaction are rather poor. More precisely, using a panel data analysis for 34 developed and developing countries, we have conducted a macro-level approach in order to see if the entrepreneurial activity is a reliable determinant of the national innovative capacity.

The novelty of this paper consists in using two broad indicators for assessing the innovation and entrepreneurial level, namely the global innovation index and the total entrepreneurial activity. We have developed a theoretical framework which shows that the TEA can have either a negative or a positive influence on the innovativeness capacity, depending on the reasons which determine a person to become entrepreneur. At the same time, this influence should be more important when we consider only the innovation outputs: transfer of knowledge and creativity.

The empirical findings partially confirm these theoretical hypotheses. First of all, the overall entrepreneurial activity does not influence the national innovative capacity, either its output component. Second, the opportunity or innovation-driven entrepreneurs have a positive impact, both on the GII and on the innovation output. However, the influence on GIOI is not stronger than in case of GII. The results show that the role of innovation-driven entrepreneurs plays an important role in knowledge creation and diffusion, but also for the quality of institutions, infrastructure and human capital –the input component of the GII.

Our approach contributes to the literature of innovation’s determinants, highlighting the role of entrepreneurship at macro-level. In addition, our paper is the first paper which makes a distinction between opportunity and necessity entrepreneurs when estimating the impact on the innovativeness level. Our findings have also policy implications. Authorities should encourage the entrepreneurial initiative not only because it is important for knowledge transfer and job creation, but also because it contributes to improving the market functionality and the quality of the human capital.

References


