

IS FISCAL POLICY ONE OF THE MOST IMPORTANT SOCIO-ECONOMIC DRIVERS FOR ENTREPRENEURIAL ACTIVITY IN EUROPEAN UNION COUNTRIES?

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Abstract. This research highlights the extent to which fiscal policies, along with government effectiveness, trade, economic growth, and education, influence the entrepreneurial environment, starting from the assumption that the effectiveness of public policies and the public administration support for entrepreneurship has proven to be a trigger for development and a means of reducing social inequalities and increasing well-being. Our analysis is based on a panel threshold regression model, which returns parameters for the predictors, in which there is a changing point in fiscal policy as the threshold variable on entrepreneurship activity. The database consisted of annual data from 2002-2019, referring to the European Union's member states, presented visually based on the data mapping process to evidence the hierarchy of the EU countries for each of the analysed phenomena. Our results evidenced tax policy, trade, and government effectiveness as significant influential factors in stimulating entrepreneurship in EU countries. Although GDP growth and education positively influenced entrepreneurial activity, the statistical tests did not confirm it. Therefore, Governments can encourage entrepreneurial opportunities through harmonised tax legislation with EU regulations and a lighter regulatory burden and policies that foster competition, lower taxes, increase transparency and provide open access for all businesses.

Keywords: fiscal policy, governance, education, entrepreneurship, dynamic panel threshold model, European Union.

JEL Classification: H21, H32, C24

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Introduction

Since the beginning of this century, the objectives of the European Union have focused on strategies related to entrepreneurship: creating a prosperous business environment and a positive attitude in society towards new businesses, developing education in entrepreneurship and promoting entrepreneurial culture, setting up a support fund and facilitate the access to finance for new businesses and those trying to create. These strategies and principles were set up by the “Small Business Act” for Europe (Commission of the European Communities, 2008) to bring added value at the EU level and improve the legal and administrative environment while considering the role of SMEs as central in the EU economy. Recently, the “Entrepreneurship Action Plan 2020” went forward towards building a prosperous business environment, supporting entrepreneurship by reducing administrative burdens, facilitating access to finance, and highlighting entrepreneurship’s social and environmental impact. Overall, the latest focus of the EU legislation and policies promoting entrepreneurship was on supporting entrepreneurship education and training (Xavier, 2013).

The literature on developing public policies promoting entrepreneurship is vast in countries worldwide. The efficiency of the public policies and the support from public administration towards entrepreneurship triggered economic development, technological progress, competitiveness, and means of reducing social inequalities and increasing well-being (Dima et al., 2016). The concept of well-being and its relationship to businesses has been promoted for a long time in terms of welfare entrepreneurship for regional and economic development. And even though there are certain dichotomies between the public and private sectors, we may observe common ideologies for welfare provision and efforts to ensure the delivery of goods and services, including public and social ones, from public authorities and markets to citizens and society. We can refer to income growth and higher employment in regions with an environment supporting entrepreneurship and areas providing more significant support from channelling public resources to welfare. In developmental states, the local authorities acted as effective agencies for the social and economic development of an area; the entrepreneurial states are the revived version, activating the institutional response and proving adaptability as a response to market opportunities, especially for emergent markets, in need for foreign investors (Blecher, 1991; White, 1996). Overall, taxes influence the activities and performance of companies to such a great extent that taxation may be considered to have an even more substantial influence on entrepreneurship than public spending. Therefore, the subject of how fiscal influences entrepreneurship has become an interesting research setting. In this regard, De Schoenmaker et al. (2014) affirms that local taxes can hamper the company’s financial performance. Accordingly, more recent studies proved local taxes’ negative impact on those regions’ financial performance, firm performance or employment growth (Gatsi et al., 2013; Fang et al., 2022). Still, they indicated that aggregate public spending, supporting infrastructure, education, or safety, increases firm profitability (Duranton et al., 2011; De Schoenmaker et al., 2014).

The economic theories developed over time, referring to fiscal policies and performance, productivity, or business sector development. If firms react differently to taxation, a flexible corporate tax and investment model is expected based on specific features such as size or

economic activity. For example, small companies rely on retained profits, while large companies may easily access borrowed funds. If the level of taxes on profits indirectly influences the net profits earned by companies, fiscal policies supporting investments and business development would be the key to an entrepreneurial environment. The Schumpeterian “creative destruction” concept, linked to the fact that economic development comes as a natural result of open markets, dynamic processes and profitable opportunities, brought a new taxation theory based on aggregate productivity growth, resulting as a consequence of the replacement of low-productivity firms by the new businesses, or by those that manage to survive based on consistent productivity (Peretto, 2007).

Overall, especially for new businesses, taxes influence the risks undertaken by entrepreneurs, subject to two types of taxes, tax on capital and tax on labour income. Therefore, if tax policies may influence the entrepreneurs’ decisions to start their businesses or not, the economic theory suggests that higher tax rates constrain entrepreneurial activity. Still, the tax code might support the private sector in employing special treatment for losses or capital investments. Of course, the effectiveness of fiscal policies makes the difference across countries and times (especially in times of financial instability). This is why investigating the government expenditure, tax revenue, GDP growth, trade, and level of education concerning entrepreneurial activity in terms of threshold makes this research innovative, going beyond the study of one state to the level of the European Union.

Based on these underpinnings, the general objective pursued in this research is to assess the influential factors for entrepreneurial activity, especially in terms of fiscal policies, as well as how these factors can positively or negatively influence entrepreneurial activity in the EU Member States, with essential spillovers on supporting sustainable entrepreneurship development.

The methodological endeavour embeds a complex procedure, with a detailed analysis of the EU-27 Member States, and an advanced econometric technique, respectively, the single threshold regression model based on Hansen’s panel threshold regression model, over the period 2002–2019. Hence, this paper explores the relationship between the socio-economic drivers for entrepreneurial activity, with an emphasis on fiscal policy. Based on these facts, it can be argued that our research is set to bring new evidence on the perspective of the development of entrepreneurial activity in terms of fiscal policies. Furthermore, our paper enriches the existing literature with an integrative, updated and complex assessment of the relationship between entrepreneurial activity, fiscal policy that comprises government expenditure and tax revenue, GDP growth rate, trade, education attainment, and government effectiveness.

Based on advanced empirical analysis, we chose to analyse the panel of 27-EU Member States since there is a wide array of specific and complex differences among them by capturing the dataset that covers the timespan between 2002–2019, is compiled based on the chosen variables. Moreover, our research examines the effects of fiscal policy on total entrepreneurial activity, also adding some specific variables in order to capture certain credentials in addition to the ones comprised by fiscal policy, respectively government expenditure and tax revenue, as follows, for example, GDP growth rate, trade, education attainment, and government effectiveness. Therefore, our paper contributes to the existing literature with a double

perspective: (i) new insight on the level of all included variables among the EU-27 countries with a complex graphical representation through data mapping; and (ii) based on updated data, the paper assesses the influences of fiscal policies, along with several variables carrying potential impact, respectively GDP growth rate, trade, education attainment, and government effectiveness on total entrepreneurial activity. Additionally, the results can sustain future research, promoting the understanding of the discussed topic, and being able to contribute to new fiscal policies that support entrepreneurial activity and economic growth.

This paper consists of several sections. Following this introduction, the second section considers a brief review of the literature on the relationship between public policies, emphasising fiscal policy and entrepreneurial activity. The following sections refer to data, methodology and the main results obtained for panel data of EU member countries. The fifth section concludes by offering several recommendations and policy implications.

1. Literature review

In recent years, decision-makers' attention has led to entrepreneurship determinants, especially in the actual context of a turbulent economic environment characterised by financial and economic crises. Research studies put the spotlight on fiscal policy since it has become a fundamental tool for entrepreneurial activity (Djankov et al., 2010; Harju & Kosonen, 2012). Furthermore, entrepreneurial activity entails the need for government interventions, leading to expansive fiscal policies that can stimulate business activities and aggregate demands (Cumming & Li, 2013; Cullen & Gordon, 2007). We will focus on the relationship between fiscal policy and entrepreneurship, but the literature presents various influential factors for entrepreneurship, helpful in analysing the main relationship described.

In reference to fiscal policy and the development of entrepreneurship, Keynesian economics considers aggregate spending (consisting of business investment, consumer spending, net government spending etc.) as a driver for economic growth and performance. Governments may adjust spending and tax policy to cover the shortfalls in the private sector, which stabilises the business cycle. The tax smoothing theory (Barro, 1979) predicts that government spending increases during booms and decreases in recessions. Accordingly, the government should smooth tax rates and finance the temporary difference between tax revenues and government spending (borrowing in recession and repaying in boom periods). Tax policy became a key factor for startups and corporate investment decisions, reflecting the willingness of investors or companies to engage in risky situations. Therefore, a neutral tax policy, simpler and more efficient for taxpayers, could remove some of the barriers for entrepreneurs and the dynamism in entrepreneurship.

The recessions induce a shift toward progressive taxation to collect more fiscal revenues. However, flat tax rates are usually considered to simplify the enforcement of the tax system and the compliance of contributors. Following the financial crisis of 2009, the European Union established a strict framework in terms of fiscal policy, updating most fiscal rules and applying various fiscal criteria for all European Union countries, along with a set of initiatives that aim to foster and stimulate many essential pillars, especially entrepreneurship and economic growth. Previous research found evidence of a moderate influence of corporate taxes

on firm births (Duranton et al., 2011; Da Rin et al., 2011; Brühlhart et al., 2012). More recently, studies proved that simplifying the tax code and not necessarily reducing the corporate tax brackets would promote entrepreneurship. In addition, tax progressivity is preferred by risk-takers and may be appealing to some entrepreneurs. New firms are indicators of a dynamic entrepreneurship environment and are more likely to rise in large municipalities, regions developed in terms of infrastructure, or those with higher levels of public expenditures. Successful tax reforms are linked to lowering the average tax burden, especially the one related to corporate income, but maintaining tax progressiveness which positively influences the birth of new firms (Bacher & Brullhart, 2013). Additionally, Ono (2019) suggests the need for a debate focusing on the most effective and adequate fiscal policies that will bring important benefits to the entire economy of the EU member states. Accordingly, the EU countries have been differently impacted by the fiscal policy (Busch et al., 2013), and following the crisis, there has been a need for a new policy agenda which involves more support for entrepreneurship leading towards economic growth (Szabo & Herman, 2012; Copeland & James, 2014). Since 2013, the corporate tax policy in the EU has shifted its focus from avoiding double taxation towards better governance and anti-abuse legislation for aggressive tax planning, tax avoidance, harmful tax competition or transfer pricing (Roland, 2019).

Reconsidering the existing fiscal problems and preventing tax evasion through tax reforms ensures the long-term sustainability of the public finances. The dynamics of public debt and reduction in government expenditures should ensure an efficient allocation of public resources, increased tax revenues based on better tax collection with greater tax compliance, and reduced corruption. Especially for emerging countries, harmonising the tax legislation based on the EU regulations helps increase competitiveness at the national level (Hackler, 2012). In addition, investment in education and infrastructure increases national competitiveness, a critical factor in emerging markets to absorb technologies from abroad (Lunina et al., 2020). This knowledge may be transferred to small businesses, and entrepreneurial activity can bloom with preferential tax treatment for these companies. Tax incentives or enhanced deductions for innovation or R&D costs could be significant fiscal measures that strongly impact development and entrepreneurship over the medium and long term.

Public underfunding may constrain economic growth and inhibit human development due to underbudgeting education or health systems, negatively affecting economic development and fiscal perspective. However, effective governance is linked to engaged entrepreneurship, as citizens are more willing to take risks and invest in new businesses when governance ensures specific political, social, and economic conditions that favour development (Parker et al., 2012). Fiscal policies were also proven to enhance citizens' well-being by ensuring equal distribution of capital through progressive taxation in terms of incomes and securing full employment and additional help for citizens who cannot provide for themselves, supporting the welfare state idea (Vatavu et al., 2019).

Martínez-Rodríguez et al. (2019) evaluated the economic factors, along with a series of socio-cultural drivers, that can have relevance and influence on total entrepreneurial activity. In this light, the authors examined and explored a sample of 32 countries, considering two different periods, one pre-crisis and the second one with the recovery period. The results suggest that expansive fiscal policy should relate to education improvements and reducing

the tax burden, while total entrepreneurship activity is largely explained by both the necessity and opportunity drivers of entrepreneurship. In addition, the authors found significant implications to support the design of effective and specific policies to promote entrepreneurship and successfully contribute to economic growth.

Leitão and Capucho (2021) engaged a series of determinants of entrepreneurial activity, as follows: (i) institutional; (ii) economic; and (iii) socio-economic factors. Results suggested the need for new efficient public policies, encouraging a high level of entrepreneurial activity, along with correct measures that the policymakers could implement. More specifically, trade produces a positive and significant effect on entrepreneurial activity, being able to stimulate and create more entrepreneurial activity. In addition, the authors evidenced a need for new public policies oriented on different competencies, valences, and skills for entrepreneurship and viable measures designed to strengthen institutional effectiveness and improve institutions' quality.

Depending on the business cycle phases, previous studies also evidenced a specific behaviour for total entrepreneurial activity – driven by necessity or opportunity (International Monetary Fund, 2016). The necessity entrepreneurs are those who start a business because they have no other jobs available, while opportunity entrepreneurs undertake an opportunity for a new business, also having a strong desire to be their manager and develop new products or services. In the first case, entrepreneurs may set their work in a primary environment, with less human capital and lower-income regions, while the second type is often described as having higher levels of education and needing to discover business opportunities with agility. For necessity entrepreneurs, in times of expansion, fiscal policies should promote tax burden reduction and education improvement. During crisis and recovery periods, fiscal policy should not establish other tax burdens, especially for entrepreneurs with low incomes and no job alternatives. The government should reduce interest rates, especially for opportunity entrepreneurs who want to expand. Regardless of these two, the level of education, creativity, and social skills are all essential for the success of the entrepreneurs' businesses (Parker et al., 2012). Education is also significant for social mobility, reducing income inequalities, catalysing and fostering business creation, and directly influencing economic growth (Tsapko-Piddubna, 2021). Although the level of education may be crucial for entrepreneurs to be able to acquire skills and possess knowledge, strong abilities have a role in ensuring business success (Peña et al., 2014). Consequently, the decision to become an entrepreneur is not necessarily influenced by the level of education (Grilo & Irigoyen, 2006) but is more dependent on other capabilities, like social skills (Baron & Markman, 2003) or creativity skills (Weitzel et al., 2010). Besides education, tax system and fiscal policies, we expect a significant impact on entrepreneurship from better governance, whilst effective governance is connected to people's positive intentions in engaging in entrepreneurship and creating a new business under favourable political, economic, and social conditions (Van de Ven, 1993).

Fiscal policy and entrepreneurship also seem sensitive to the harmonisation of taxation. In a recent study on the Economic and Monetary Union (EMU) countries, Liargovas et al. (2022) clearly pointed out that the existing literature sustains two major directions, respectively that fiscal stability carries a positive effect on entrepreneurship and competitiveness and an increase in public debt has no impact on growth rates. In this light, due to the de-

pendence on national policies, a special focus should be on entrepreneurship and competitiveness rather than fiscal convergence and balance. Dima et al. (2013) emphasised that the democratic framework, legal basis, and social fairness are the most critical factors supporting entrepreneurship within the European Union Member States. Although the EU preserves an open but unified market, political crises, economic uncertainties, or labour market rigidity all inhibit entrepreneurial activity. However, perceived opportunities and capabilities strongly encourage private sector development based on public institutions' intellectual capital and governance efficiency.

At a national level, entrepreneurial activity is correlated with the economic development of countries (Carree et al., 2007; Freytag & Thurik, 2007; Wennekers et al., 2008). Moreover, economic growth has a particular priority in the Sustainable Development Goals set up by the Agenda 2030 (Garcia et al., 2020): it is now linked to sustainability to reduce the gaps and inequalities between regions and countries. Tax benefits or specific tax treatments may offer protection of profits or other advantages to increase attractiveness for businesses with expansion and growth opportunities, setting up a framework for sustainable development in line with the economic, social, and territorial cohesion to reduce disparities in wealth and development between the regions. In addition, the government increased its role in encouraging firm productivity, setting up tax policies that support capital or R&D investments or other means of enhancing productivity through investments. These measures seem to impact large firms more, as small businesses have a lower productivity gap. Due to the heterogeneous effects of taxation across countries and firms, tax should be treated as related to small or large firms, primarily based on the companies' rate of productivity growth (Gemmel et al., 2018; Garcia et al., 2020).

The residential location also dramatically impacts the decision to set up a business, particularly for entrepreneurs. For example, new start-ups are often home-based, especially when linked to e-commerce or affordable information technologies, as the statistics indicated after the recovery from the recent financial crisis; in the USA, in 2012, approximately two-thirds of the new businesses started by the owners' homes. In addition, local fiscal decisions targeting entrepreneurship and small firms influence regional development by helping small businesses grow (Guo & Cheng, 2018). But even previous research on entrepreneurs' choice of new business locations also indicated their tendency to keep their business in the residential areas to cut labour costs (Figueiredo et al., 2002; Stam, 2007). These are all subject to the Tiebout competition model (Tiebout, 1956), according to which citizens, as consumers of public goods, will choose to settle and consume the public goods from the region in which they pay taxes. Considering this model for companies, we expect start-ups to bloom and operate in countries or regions where local taxes are in their favour. Foreign direct investments from multinationals seem to support economic development, while an increase in the number of new businesses will reflect, over the long run, lower unemployment, increased demand, and consumer spending (Acs et al., 2007; Anyadike-Danes et al., 2011).

With these strong influences from entrepreneurship on economic and social development, policymakers at all levels should set up a framework for an ecosystem of innovation and entrepreneurship, ensuring economic recovery, sustainability, regional transformations, and job creation (Tiebout, 1956). Moreover, innovation is an essential factor in economic

growth and entrepreneurship. And although entrepreneurship and innovation may both be considered a source of tax, local governments should look for means of creating and incentivising the risk-takers, making public and private funding available for entrepreneurs and small and new businesses, increasing the capacity of the local economies to absorb innovation. Likewise, mitigating the comprehensive effects of the Covid-19 pandemic crisis requires taking appropriate decisions. Regarding this aspect, Braunerhjelm (2022) highlights the need to adopt measures aimed at innovation, the effort to modernise and update knowledge and entrepreneurial processes in the context of the current crisis caused by the COVID-19 pandemic. Furthermore, the author proposed a realignment in terms of policies, not only at the micro level but also at the macro level, aiming at increasing the potential of economic growth and the rethinking and resilience of economies that followed the crisis, along with the need to reactivate fiscal policies.

Furthermore, the business environment characterised by corruption, uncertainty and constant change of fiscal policies leads to the reluctant attitude of entrepreneurs who want to employ resources under conditions of good governance and rational policies that allow the creation of a stable business environment. Withal, Lobonț et al. (2022) attested that although improving the level of education can stimulate entrepreneurial activity, there are still various factors, such as governance effectiveness, that can have a negative effect on entrepreneurship, a fact caused by the existence of the multitude of barriers to entrepreneurship that are characterised by excessive regulations and taxes that hinder the motivation of entrepreneurs and their predisposition towards entrepreneurial activity. Under certain circumstances, on the one hand, the business innovation process can be boosted (a positive impact) by corruption, and on the other hand, corruption can have a negative impact on company innovation (Pirtea et al., 2019). Hence, the support of public administrations, along with effective public policies, can stimulate entrepreneurship. Regarding this aspect, Costea et al. (2022) applied a scientific data mapping analysis evidencing the relationship between public policies and entrepreneurship.

After overviewing the literature on the topic, we propose two research hypotheses:

Hypothesis 1. Fiscal policy, along with government effectiveness, trade, economic growth, and education, can encourage people to start businesses and stimulate entrepreneurial activities overall.

Hypothesis 2. After reaching a certain level, fiscal policy may negatively influence entrepreneurial activity.

Acknowledging the various indicators with potential impact on entrepreneurship, we expect entrepreneurial activity to be significantly impacted by government expenditures and tax revenues, supporting its development through the allocation of public funds and favourable public policies. We also expect education to play a vital role in entrepreneurship, as highly educated individuals would be more successful in their entrepreneurial activities. Considering that good performance of the economy and government would propel entrepreneurship, we also add in our analysis proxies of trade, economic growth, and government effectiveness, expecting significant positive influence towards the development of the entrepreneurial activity.

2. Methodology

2.1. Data

We consider total entrepreneurial activity (EA) to proxy the entrepreneurial activity as the dependent variable. Pinillos and Reyes (2011) presented this indicator as the most representative one to reflect the entrepreneurial phenomenon within an economy, being retrieved from the Global Entrepreneurship Monitor (GEM). EA is specific to countries and represents the percentage of individuals between 18 and 64 who are actively engaged in starting or managing a new business. According to Bygrave et al. (2003), if individuals are involved in both starting and managing new businesses, they are counted only once. The threshold variable is fiscal policy, including government expenditure and tax revenue. These variables were chosen as fiscal policy refers to the efficient use of government spending and public policies related to taxation that influences macroeconomic conditions related to the demand, inflation, employment, or economic growth (Mankiw, 2014; Taylor, 2017).

The control variables refer to GDP growth, trade volume (as % of GDP), education, and government effectiveness. Although entrepreneurial activity refers to the individual level, it also relies on the business environment and macroeconomic conditions. Accordingly, we expect good governance and healthy economic situations to propel entrepreneurial activity. Higher economic growth rates should signal higher investment returns and attract people to start a business. Also, international trade should positively impact entrepreneurial activity. However, in developing countries, previous research (Acs et al., 2008) highlighted a negative relationship between entrepreneurial activity and economic growth. While human capital was proven to support entrepreneurial activity (Burton-Jones & Spender, 2011), we expect education to play a vital role in accumulating human capital and, therefore, a strong relationship between education and the level of entrepreneurial activity. The government's effectiveness reflects perceptions of the quality of different dimensions (i.e., public services, civil service, policy formulation and implementation) and the credibility that the government inspires regarding its dedication to the promoted public policies.

Hence, the analysis is made for the 2002–2019 period, capturing three different types of variables, as follows:

- i) total entrepreneurial activity (EA) as a dependent variable;
- ii) fiscal policy comprising government expenditure and tax revenue for threshold variable;
- iii) GDP growth rate, trade, education attainment, and government effectiveness as control variables.

The summary statistics of every variable (Table 1), and the graphical representation (Figure 1) of the dependent (EA), threshold (government expenditure and tax revenue) and control variables (GDP growth rate, trade, education attainment, and government effectiveness) were processed in Stata. According to the p-values of Skewness, Kurtosis and Shapiro-Francia tests in Table 1, all the variables in our analysis are subject to the non-normal distribution.

Table 1. The summary statistics of the variables in the overall data sample (EU-27, 2019) (source: authors' own process in Stata 17)

Variables	Mean	Standard Deviation	Min	Max	Skewness	Kurtosis	S-W test (p-value)
EA	89.71	4.33	82.06	96.00	-1.28	4.48	0.00
Government expenditure	42.43	6.82	25.36	55.38	-0.45	5.21	0.00
Tax revenue	21.48	4.80	11.49	34.04	2.41	13.96	0.00
GDP growth rate	2.72	1.43	0.34	5.55	-0.37	9.22	0.00
Trade	1.39	0.69	0.60	3.82	1.89	7.31	0.00
Education Attainment	1.14	0.20	0.89	1.56	1.74	5.97	0.00
Government effectiveness	1.05	0.55	-0.28	1.94	-0.14	2.43	0.00

Note: The S-W test denotes the Shapiro-Francia test (Shapiro & Francia, 1972) examining the data normality. For a p-value lower than 0.05, we reject the null hypothesis of normality.

To comprise the hierarchy and to highlight the specificity of the variables included in our model at the level of EU Member States in 2019, a data mapping technique was applied, as presented in Figure 1. This graphically highlights the total entrepreneurial activity (EA) (a), government expenditure (b), tax revenue (c), GDP growth rate (d), trade (e), educational attainment (f) and government effectiveness (g) in 2019 for the EU-27 states. The most significant total entrepreneurial activity (EA) occurs in Finland, Latvia, Estonia, Netherlands, Ireland, and in Greece. On the opposite side, we can see countries like Slovakia, Poland, the Czech Republic, Austria, Croatia, and even Germany, registering the lowest proportions of total entrepreneurial activity (EA) in the EU-27.

In reference to government expenditure, the graphical representation highlights that this variable has the highest level in Denmark, Finland, Italy, Austria, France, and Belgium. Furthermore, the medium values were registered in Germany, Hungary, Croatia, and Slovenia. Government expenditure was at the lowest level in Ireland, Sweden, Lithuania, Romania, and Bulgaria in 2019. Tax revenue maintains high levels in countries like Sweden, Denmark, France, and Greece. The lowest tax revenue in relation to the EU-27 average occurred in Spain, Romania, Poland, the Czech Republic, Germany, and Ireland. We observe that the GDP growth rate has prominent values that occur in many European Union countries, namely Hungary, Poland, Lithuania, Estonia, and Ireland. With reference to the trade variable, the highest degree was registered in Hungary, Slovakia, Belgium, Ireland, and also Spain, Netherlands, the Czech Republic, Lithuania, and Estonia. Moreover, the lowest values within the EU-27 in 2019 were observed by Italy, France, Germany, Finland, Romania, Greece, and Portugal. Furthermore, educational attainment was notable within the EU-27 in 2019 (particularly in Sweden, Finland, Denmark, Ireland, Belgium, and the Netherlands). Along the same lines, the lowest values of education attainment were observed in several countries, such as Slovakia, Austria, Romania, Bulgaria, and Croatia. Moreover, government effectiveness presents the highest value in Finland, Sweden, Germany, Denmark, and the Netherlands.

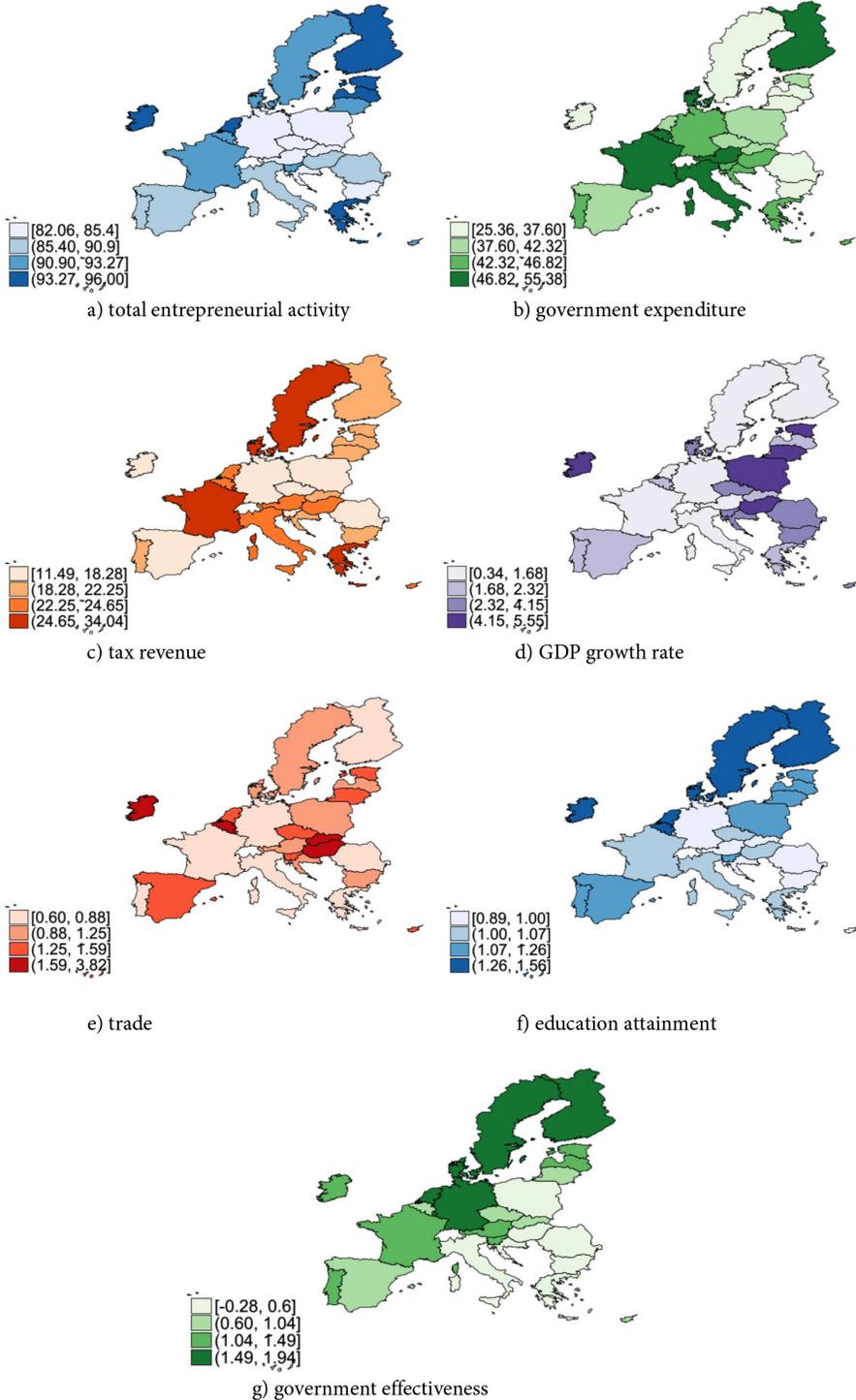


Figure 1. a – Total entrepreneurial activity (EA); b – Government expenditure; c – Tax revenue; d – GDP growth rate; e – Trade; f – Education attainment; g – Government effectiveness levels in 2019, European Union (EU)-27 (source: own process in Stata 17)

On the other hand, the lowest values were found in Italy, Romania, Bulgaria, Greece, Poland, Croatia, and Hungary.

From the perspective of time and frequency domains, the annual data of Total entrepreneurial activity (EA), Government expenditure and Tax revenue from 2002 to 2019 are plotted in Figure 2. The variables present non-linear attributes, which provides the inspiration to employ the non-linear causality test method to investigate the relationship between fiscal policy and entrepreneurship activity.

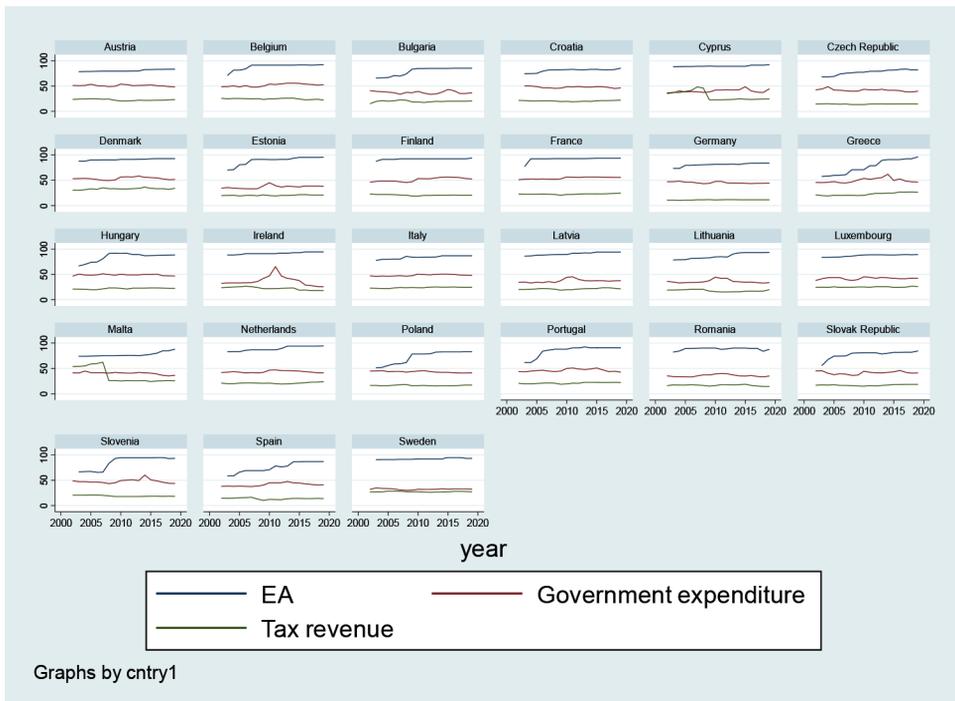


Figure 2. The trends of Total entrepreneurial activity (EA), Government expenditure and Tax revenue in the European Union (EU)-27 (source: own process in Stata 17)

In this framework, along with graphical representation, at the level of EU-27 member states, there is an urgent need to reinforce the existing level and connection between total entrepreneurial activity and fiscal policy, in general, and, in particular, its relation to education attainment, government effectiveness, GDP growth rate, and trade.

Table 2. Description of proxy variables employed in the analysis

Index	Description	Source
Entrepreneurial activity	The number of adults per 100 “who are either a nascent entrepreneur or owner-manager of a new business”	Global Entrepreneurship Monitor
Government expenditure	General government expenditure (% of GDP)	World Development Indicators
Tax revenue	Tax revenue (% of GDP)	
GDP growth rate	GDP growth (annual %)	

End of Table 2

Index	Description	Source
Trade	“The sum of exports and imports of goods and services, measured as a share of GDP” (% of GDP)	
Education attainment	School enrolment, referring to “number of students enrolled in secondary education regardless of age by the population of the age group which officially corresponds to secondary education” (% gross)	
Government effectiveness	The perceptions of the quality of public services	World Governance Indicators

Note: data sources are available on the websites: <https://www.gemconsortium.org/>, <https://databank.worldbank.org/source/world-development-indicators>, and <https://databank.worldbank.org/source/worldwide-governance-indicators>

The sample period ranges from 2002 to 2019, on an annual basis, and the indicators refer to the countries of the European Union. The data was collected from several independent sources, as described in Table 2.

2.2. Research methods

Because of the non-linear distribution characteristics of the variables, we consider the panel threshold regression method, applicable to capture the non-linear relationship between dependent and independent variables. Furthermore, combined with the theoretical analysis, the non-linear relationship between fiscal policy and entrepreneurial activity may lead to the insufficiency of asymptotic distribution. Therefore, it is reasonable to investigate if there is an optimal level of fiscal policy to promote entrepreneurship activity from 2002 to 2019 in the 27 European Union Member States, as the prior results were ambiguous.

The traditional least-squared estimation method was developed by Hansen’s (1999) into the advanced panel threshold regression model. After determining the stationarity of the variables, we test if there is a threshold. If we are not able to reject the null hypothesis, it means that there is no threshold. The bootstrap method suggested by Hansen (1999) employs simulations that calculate the asymptotic distribution of the testing statistics, along with testing the significance of the threshold effect. To estimate the panel threshold model, we applied a two-stage ordinary least squares (OLS) method. Firstly, we separately computed the sum of the squared errors (SSE) for any given threshold. Secondly, by minimising the sum of the squares, we obtained the estimation of the threshold by using the figures calculated in the first stage. In the final stage, the estimated threshold value is employed to estimate the coefficients of each regime.

Our model was inspired by the one developed by Lobonç et al (2022), who evidenced the non-linear effect of public policy (through governance effectiveness) on the entrepreneurial environment, but it brings more insights into fiscal policy implications on entrepreneurship. Accordingly, the single threshold model was constructed as follows:

$$EA_{it} = \{\mu_i + \beta_1 FP_{it} + \alpha' x_{it} + \varepsilon_{it} \text{ if } FP_{it} \leq \gamma \mu_i + \beta_2 FP_{it} + \alpha' x_{it} + \varepsilon_{it} \text{ if } FP_{it} > \gamma ; \quad (1)$$

$$\alpha = (\alpha_1, \alpha_2, \alpha_3, \alpha_4)' \quad x_{it} = (q_{it}, m_{it}, s_{it}, v_{it});$$

$$\{EA_{it}, FP_{it}, x_{it} : 1 \leq i \leq n, 1 \leq t \leq T\},$$

where: EA_{it} denotes the total entrepreneurial activity; FP_{it} represents the level of fiscal policy, being the threshold variable of the model; γ designates the estimated threshold value; β_1 and β_2 represent the estimated threshold coefficients of different threshold values; x_{it} is the vector of 4×1 , comprising the control variables q_{it} , m_{it} , s_{it} and v_{it} ; α_1 , α_2 , α_3 and α_4 are the estimated coefficients corresponding to the control variables; q_{it} , m_{it} , s_{it} and v_{it} are the control variables (growth rate of the GDP, trade volume, educational attainment, and government effectiveness, respectively); μ_i is a fixed effect, employed to underline the countries' heterogeneity under different levels of trade dependency; ε_{it} is the white noise process or error term, which subjects to $iid(0, \sigma^2)$; i is 1 ... 27 (representing each of the EU Member States); t represents the year, referring to the 2002–2019 period.

The advanced threshold regression can be rewritten as follows:

$$EA_{it} = \mu_i + \beta_1 FP_{it} I(FP_{it} \leq \gamma) + \beta_2 FP_{it} I(FP_{it} > \gamma) + \alpha' x_{it} + \varepsilon_{it}. \tag{2}$$

This second equation represents a single threshold regression model, but the empirical analysis may result in numerous thresholds. Therefore, the formula of the double threshold regression model can be detailed as further:

$$EA_{i,t} = \{\mu_i + \beta'_1 FP_{it}(\gamma) + \alpha'_i x_{it} + \varepsilon_{it} \text{ if } FP_{it} \leq \gamma_1, \mu_i + \beta'_1 FP_{it}(\gamma) + \alpha'_i x_{it} + \varepsilon_{it},$$

$$\text{if } \gamma_1 < FP_{it} \leq \gamma_2, \mu_i + \beta'_1 FP_{it}(\gamma) + \alpha'_i x_{it} + \varepsilon_{it} \text{ if } FP_{it} > \gamma_2\}. \tag{3}$$

Equation (3) can also be simplified as follows:

$$EA_{it} = \mu_i + \beta'_1 FP_{it} I(FP_{it} \leq \gamma_1) + \beta'_2 FP_{it} I(\gamma_1 < FP_{it} \leq \gamma_2) +$$

$$\beta'_3 FP_{it} I(FP_{it} > \gamma_2) + \alpha' x_{it} + \varepsilon_{it}, \tag{4}$$

where the threshold value is $\gamma_1 < \gamma_2$. Accordingly, it may be extended into the multiple threshold model.

3. Results and discussion

3.1. Results

We consider a panel threshold regression model that allowed us to obtain new insights into the interaction relationship between fiscal policy and entrepreneurial activity. Moreover, a great deal of attention must be addressed to the need to include stationary variables that allow the avoidance of the spurious regression problem. Therefore, the first step is to proceed with unit root tests before the panel threshold regression model. Two panel unit root tests proposed by Levin et al. (2002) and Im et al. (2003) were employed to increase the reliability of the results. Table 3 reveals that the null hypothesis of unit roots is rejected, implying that all the variables in our analysis are stationary, proving the panel threshold regression premise.

Table 3. Results from the unit root tests adequate to panel data

Variables	Levin et al. (2002)		Im et al. (2003)	
	t-statistic	p-value	t-statistic	p-value
Total entrepreneurial activity	-6.891***	0.000	-3.783***	0.000
Government expenditure	-0.838	0.799	-1.598*	0.055
Tax revenue	-3.027***	0.001	-1.174	0.120
GDP growth rate	-5.542***	0.000	-4.291***	0.000
Trade	-2.450***	0.007	-1.886**	0.029
Education attainment	-5.279***	0.000	-3.808***	0.000
Government effectiveness	-5.118***	0.000	-2.932***	0.001

Note: 1. *, ** and *** indicates significance at the 10%, 5% and 1% levels, respectively.
2. All variables have been logarithmically processed.

The panel threshold regression between government expenditure and entrepreneurial activity in the EU countries are presented in Table 4, after repeating 10,000 times in bootstrapping of the sample. Results indicate a threshold effect (for the value 1.651) evidenced by the single threshold model (under the 5% significance level), but no significance for the double threshold effect is not significant. This proves that there are different effects from government expenditure on EA before and after the threshold value of 1.651. After also observing the results from Table 5, we confirm that when government expenditure is lower than 1.651, the coefficient $\hat{\beta}_1$ is 0.162. At this stage, government expenditure positively influences entrepreneurial activity. Once the government expenditure exceeds the threshold value, the coefficient $\hat{\beta}_2$ is -0.033. Accordingly, when government expenditure is more than 1.651, the effect of government expenditure on enterprise activities becomes negative.

Table 4. Threshold effects between government expenditure and entrepreneurship in EU countries

	Threshold value	F-statistics	p-value
Government expenditure			
Single Threshold Effect Test	1.651	11.235**	0.010
Double Threshold Effect Test	0.839	11.993	0.370
	1.651		

Note: 1. The critical values of the F-statistics for the single threshold effect are 5.813, 6.422, and 9.475 at the respective 10%, 5%, 1% levels; the critical values for the double threshold effect are 22.055, 26.854, and 43.397 at the respective 10%, 5%, 1% levels. 2. ** indicates significance at the 5% level.

Table 5. The coefficients estimated for government expenditure

	Estimated Value	OLS se	t _{OLS}	White se	t _{White}
$\hat{\beta}_1$	0.162	0.060	2.700***	0.090	1.800*
$\hat{\beta}_2$	-0.033	0.026	-1.269	0.015	-2.200***

Note: 1. OLS se (White se) refers to homogeneous (heterogeneous) standard deviations.
2. $\hat{\beta}_1$ ($\hat{\beta}_2$) indicates that the coefficient estimates are smaller (larger) than the threshold value.
3. * and *** indicate significance at the 10% and 1% levels, respectively.

Table 6. The coefficients estimated for the selected control variables

	Estimated Value	OLS se	t _{OLS}	White se	t _{White}
$\widehat{\alpha}_1$	0.019	0.046	0.413	0.017	1.117
$\widehat{\alpha}_2$	-0.034	0.033	-1.030	0.012	-2.833***
$\widehat{\alpha}_3$	0.013	0.032	0.406	0.015	0.866
$\widehat{\alpha}_4$	0.056	0.046	1.217	0.034	1.647*

Note: * and *** indicate significance at the 10% and 1% levels, respectively.

As for control variables, based on the statistically significant coefficients from Table 6, we observe that trade has a negative effect on total entrepreneurial activity and government effectiveness has a positive effect on it.

Table 7 reports the panel threshold regression between tax revenue and entrepreneurial activity in the 27-EU member states. Once again, the statistical significance of the threshold effect is proven only for the single threshold model, and the double threshold effect is not significant. In this case, the single threshold value is 1.517, which means that the influence of tax revenue on EA before and after this value are opposite. Referring to Table 8 as well, we can state that when tax revenue is lower than 1.517, the coefficient $\widehat{\beta}_1$ is 0.173. At this stage, tax revenue will promote total entrepreneurial activity (having a positive influence). When the tax revenue exceeds the threshold value, the coefficient $\widehat{\beta}_2$ is -0.048, which means that tax revenue may hinder enterprise activities if tax revenue exceeds 1.517. Overall, we expect tax revenues to support entrepreneurship development in a country.

Table 7. Threshold effects between tax revenue and entrepreneurship in EU countries

	Threshold value	F-statistics	p-value
Tax revenue			
Single Threshold Effect Test	1.517	14.145**	0.020
Double Threshold Effect Test	1.517	13.469	0.310
	2.362		

Note: 1. The critical values of the F-statistics for the single threshold effect are 56.272, 7.240, and 15.203 at the respective 10%, 5%, 1% levels; the critical values for the double threshold effect are 21.349, 31.444, and 40.365 at the respective 10%, 5%, 1% levels. 2. ** indicates significance at the 5% level.

Table 8. The coefficients estimated for tax revenue

	Estimated Value	OLS se	t _{OLS}	White se	t _{White}
$\widehat{\beta}_1$	0.173	0.060	2.882***	0.088	1.966**
$\widehat{\beta}_2$	-0.048	0.027	-1.777*	0.017	-2.823***

Note: 1. OLS se (White se) refers to homogeneous (heterogeneous) standard deviations.

- $\widehat{\beta}_1$ ($\widehat{\beta}_2$) indicates that the coefficient estimates are smaller (larger) than the threshold value.
- * and *** indicate significance at the 10% and 1% levels, respectively.

Table 9. The coefficients estimated for the selected control variables

	Estimated Value	OLS se	t_{OLS}	White se	t_{White}
$\hat{\alpha}_1$	0.023	0.046	0.500	0.018	1.277
$\hat{\alpha}_2$	-0.035	0.033	1.061	0.013	2.692***
$\hat{\alpha}_3$	0.009	0.032	0.281	0.015	0.600
$\hat{\alpha}_4$	0.072	0.047	1.532	0.037	1.946*

Note: * and *** indicate significance at the 10% and 1% levels, respectively.

Once again, for the control variables presented in Table 9, we mention those with a statistically significant coefficient: trade negatively influences total entrepreneurial activity, while government effectiveness has a positive influence on it.

3.2. Discussion

Based on the first results of the threshold analysis, it was indicated that once the government expenditure exceeds the threshold value of 1.651, the effect of government expenditure on enterprise activities shifts toward a negative one. We mention that this threshold is an extreme value considering that government expenditures were evaluated as % of GDP. However, a negative influence of government expenditures on entrepreneurship might be explained through a higher burden of regulations, which increases government costs, or a non-productive expenditure (Islam, 2015; Kuncoro, 2014). Moreover, significant public costs would rise in social welfare and the level of government expenditures, especially for countries with high unemployment. And although public spending for welfare provides a safety net, it increases the opportunity costs for entrepreneurship, discouraging its development. These are several reasons for the negative impact of government spending on entrepreneurship. Still, they should be related to exceptional situations because, in general, government expenditures positively impact and support entrepreneurial activities. Islam (2015) examined the composition of government spending based on some different strands, including fiscal policy, by developing a conceptual model since an increase in public and social goods can stimulate entrepreneurial activity. The paper examined various empirical models and data from the existing literature, including the GEM database. The results confirmed the negative effect of government spending on entrepreneurship. Moreover, the authors noted that entrepreneurial activity could be stimulated by an increase in the share of government spending on both public and social goods. Furthermore, in the context of fiscal policy, according to Kneller and McGowan (2011), entrepreneurship may be encouraged by decreasing government spending.

The threshold analysis for tax revenue and entrepreneurship also evidenced an extreme value for the change in the influence. If tax revenue goes beyond 1.517, their impact on EA would be negative. But considering that our database evaluates tax revenues as % of GDP, this threshold value is not attainable. Therefore, we can conclude that the level of tax revenue represents a significant and direct factor for entrepreneurship, sustaining its development. In addition, tax policies usually favour micro-enterprises or start-ups, compared to more

prominent companies, with a lower tax rate or tax allowances for business development and accrual of wealth within new businesses. This direct relationship between tax revenue and total entrepreneurial activity evidenced in the European Union case is consistent with previous research evidencing a positive influence of tax revenue and even tax rates on entrepreneurship (Bacher & Brulhart, 2013; Da Rin et al., 2011; Wennekers et al., 2008; Parker & Robson, 2004).

From the control variables employed in the entrepreneurship and government expenditures analysis, there were only two statistically significant, trade and government effectiveness. Trade carries a negative influence on entrepreneurial activity, while government effectiveness is positive. Considering that the trade variable is based on both imports and exports, big companies expect a high level of trade to be realised. Small enterprises and start-ups struggle to promote their new products and services and gain a small market share. Therefore, in countries where large companies lead the level of trade, entrepreneurship would not be stimulated because the effort of market penetration and business development is very high. However, government effectiveness is a vital factor in entrepreneurial activity. Previous research also evidenced that effective governance is linked to engaged entrepreneurship (Parker et al., 2012), and citizens seem to be more willing to take risks and become entrepreneurs when their perceptions of the quality of public services are high. Additionally, government policies can strongly influence the development of the entrepreneurial ecosystem, supporting entrepreneurship education, developing R&D and innovation activities, and supporting the development strategies of small firms.

Threshold models offer a simply interpretable way to model some instances of nonlinear relationships, where the predictors are associated with the outcome variables in a threshold-dependent way by introducing a parameter for the changing point. Our study evidenced some extreme changing issues, leading us to believe that fiscal policies have a significant favourable influence on entrepreneurial activity in the case of EU member states, supporting sustainable entrepreneurship development. Future research may consider an extended set of countries, and even a threshold analysis on sub-samples, to evidence differences between developed and emerging countries or differences depending on the fiscal pressure and its influence on the development of entrepreneurship.

Conclusions

The previous literature does not provide very recent evidence on the perspective of the development of entrepreneurial activity in terms of fiscal policies. Therefore, we chose to study the influence of fiscal policies on entrepreneurship in all the EU member countries. Considering the non-linear characteristics of the variables, the panel regression model is employed to investigate if there exists an optimal level of fiscal policy to promote entrepreneurial activity. The empirical results show that from 2002 to 2019, the single threshold effect is significant under the 5% significance level, which means that there are different effects from government expenditure on entrepreneurial activity before and after the threshold value. When government expenditure is under the threshold value, it positively influences total entrepreneurial activity. Once the government expenditure exceeds this threshold value, its effect on enterprise activities becomes negative. A similar result occurs when we select the tax revenue as

the proxy variable of the fiscal policy. In the first stage, when tax revenue is lower than the threshold value, tax revenue will promote total entrepreneurial activity. Once the tax revenue exceeds the threshold value, the tax revenue may hinder enterprise activities. These findings are consistent with the theoretical hypotheses setup after reviewing the literature.

Several indicators were included in the analysis of entrepreneurship, such as the GDP growth rate, education, trade, and government effectiveness. The trade and government effectiveness proved to be significant and influential factors for entrepreneurial activity in EU countries, while the statistical tests did not confirm the GDP growth and education's positive influence on entrepreneurial activity.

Based on our results, some policy implications can be inferred for policy-makers. Increasing government expenditure and tax is not always better and tends to hinder entrepreneurial activity after a point. The optimal level of fiscal policy is a key concern for policymakers attempting to stimulate entrepreneurial activity. Moderate fiscal policies have the power to increase entrepreneurship and reduce the costs involved with setting up a business, facilitating their setup through eased regulations. Governments can encourage entrepreneurial opportunities through a lighter regulatory burden and policies that foster competition, lower taxes, increase transparency and provide open access for all businesses. Public policies should also encourage savings to accumulate wealth, which may be turned into an investment. Entrepreneurs have limited access to external funds and must pitch their business idea, convincing investors to fund them if they do not have the necessary capital. Progressive taxes may be constraining new businesses, discouraging supplementary efforts and savings expected from entrepreneurs. On the contrary, higher income taxes can make self-employment more desirable. Therefore, lower taxes for micro-enterprises or tax advantages related to self-employment, setting up a start-up or investing in technological equipment are just a few of the fiscal policies to revive entrepreneurship in a country.

Furthermore, we link the development of entrepreneurial activity to sustainable development because it can help reduce the gaps and inequalities between countries. Moreover, tax benefits may offer protection of profits or other advantages to increase attractiveness for businesses with expansion and growth opportunities. Overall, our study proves the relevance of public policies for entrepreneurship development, as entrepreneurs feel more support in an economy characterised by good governance and effective government spending.

Following this extensive research on the comprehensive literature and based on the recent data and empirical results, several recommendations of interest to policymakers may be mentioned. First, removing regulatory barriers for entrepreneurs would simplify the licensing rules and increase support for establishing new businesses. A simpler tax code would remove some of the tax barriers, simplifying the compliance of contributors and the enforcement of the tax system. The main effects of taxation on entrepreneurship may be reflected in a three levelled framework based on the risks taken by entrepreneurs, their productivity and outputs, and the costs they must cover. Policymakers should consider the large impact of the tax code and amend the level of taxes required from the entrepreneurial community, which may be an engine to accelerate economic growth. Governments continue to subsidise the creation of businesses because there is a positive link between entrepreneurship and job creation, among other desirable economic phenomena. Increasing competitiveness in the markets allows an efficient allocation of resources in the economy. And these are just a few reasons for public

policies and strategies (including in the European Union) should focus on entrepreneurship and its support and development, having a unique contribution to economic growth and innovation.

Our research is not without limitations, acknowledging the relatively reduced sample of indicators, respectively a small number of control variables, alongside the number of observations included in our empirical analysis. Considering the restricted access to relevant data, another limitation is related to the analysis performed only for the 2002–2019 period. However, our research offers a general framework of analysis, focusing on the dimensions and associated coordinates of socio-economic drivers for entrepreneurial activity, with an emphasis on fiscal policy, with beneficial spillovers on the total entrepreneurial activities for the 27 EU Member States. Further development of the current research will overcome these limitations by focusing on entrepreneurial and fiscal policies that need to be strengthened and tailored to each of these member states according to their heterogeneity. Hence, we aim to expand the research by considering a larger panel regarding the time span and including other control variables that might also have a high statistical significance, providing additional robustness.

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