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Article

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MANAGEMENT | RESEARCH ARTICLE

Entrepreneurship in secondary and tertiary sectors: The same determinants?

Gonçalo Rodrigues Brás^{a,b} and Elias Soukiazis^{b,c}

Abstract: The aim of this study is to test empirically the determinants of entrepreneurship (overall and sectoral) in the Portuguese economy. Despite the methodological limitations inherent in such studies, which are mainly due to the incompatibility of some series and the temporal limitations of some data, this challenge is fuelled by the novelty of a cross-sectoral view of the entrepreneurial phenomenon. For this purpose, we employ an estimation approach based on time-series models to confirm (or reject) diverse hypotheses. The main results indicate that the determinants of entrepreneurship in the industry are significantly different from the determinants of entrepreneurship in the services sector in Portugal. On the other hand, the determinants of entrepreneurship in the service sector are very similar to those explaining the overall entrepreneurial activity, due to the high share of services in the total economic activity. The main conclusions of the study can guide institutional decision-makers to adopt adequate policies for promoting entrepreneurship in Portugal. Additionally, strategic routes are suggested for the sustainable development of entrepreneurial activity.

Subjects: Development Economics; Entrepreneurship; Small Business Management

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PUBLIC INTEREST STATEMENT

There is still no known study that differentiates the determinants of entrepreneurship in the industry from those in the services sector. The study presented here attempts to fill this gap, adopting a novel approach that makes it possible to determine the macroeconomic factors that contribute most to entrepreneurial activity, and paying particular attention to sectoral differentiation, i.e. the secondary (industry) and tertiary (services) sectors. The main findings indicate that the determinants of entrepreneurship in the industry are significantly different from those of the services sector in Portugal. This relatively narrow focus provides the desirable (and necessary) studies on sustainable entrepreneurship with a plausible reason to consider this sectoral distinction. Therefore, policymakers should reflect deeply on refurbishing the national strategy for entrepreneurship for the different sectors: primary sector, secondary sector, and tertiary sector of the economy.

Keywords: entrepreneurship; sectoral entrepreneurship; determinants of entrepreneurship; entrepreneurial activity; time-series models

JEL classifications: L26; M13; M21

1. Introduction

Given that sources of information in the area of entrepreneurial activity are scarce in Portugal, we highlight some features revealed about the Portuguese reality in the latest report of the Global Entrepreneurship Monitor (GEM). According to the source cited, Portugal recorded a total entrepreneurial activity (TEA) rate of 8.15% in 2016: that is, for every 100 individuals in Portugal, there are approximately 8 entrepreneurs who are involved in start-up processes or in the management of new businesses. Furthermore, a report developed by OECD (2018) shows that Portugal has one of the highest birth rates of firms in 2016, which represents useful information on the dynamism in the Portuguese economy. Adding to this fact and for the same period, the abovementioned report shows that on the labour market Portugal has the highest share of newly born enterprises in total employment of active enterprises, in terms of the number of persons. A merely brief review of these fast track data justifies the study of entrepreneurial activity in Portugal but the scarcity of studies over long time periods in Portugal was an extra motivation. Thus, it is analysed the demographic evolution of Portuguese companies over a (relatively) long period in an attempt to explore potential factors to explain the entrepreneurial activity.

Our aim is to fill a gap in the literature on entrepreneurship in Portugal; therefore, a multiplicity of (macroeconomic) determinants that can influence the entrepreneurial activity of the country will be explored; moreover, the measurement of entrepreneurial activity will itself constitute a stimulus to research despite the lack of data in this particular area. On the other hand, there are several studies to decode the determinants of entrepreneurship for a number of countries (Brás, 2020; Dvouletý, 2018; Velilla & Ortega, 2017) in a given specific country (Ghani et al., 2014; Miranda et al., 2017; Rodríguez-Gulías et al., 2016) or even arguing new methodologies to achieve that purpose (Arin et al., 2015). Still, it is unknown a study that differentiates the determinants of entrepreneurship from industry to services sector. Hence, the study presented here attempts to fill this gap, assuming the novel character that will lead to the determination of the macroeconomic factors that contribute most to entrepreneurial activity in Portugal, with particular attention being paid to sectoral differentiation, i.e. the secondary (industry) and tertiary (services) sectors. To this end and to distinguish this work from other published studies regarding entrepreneurship as a whole at the country level, this study makes a sectorial differentiation of entrepreneurship and examines the specific determinants of entrepreneurship in industry and in the services sector.

To achieve this objective, the paper is divided into five main sections. The first one introduces the determinants of entrepreneurship and important hypotheses that will be tested empirically. The Methods section describes the study design, particularly the aspects related to sampling, data analysis, and research procedures. In the subsequent section, the theoretical hypotheses are tested and the results analysed objectively. The empirical findings are then discussed in the light of the literature review in section 5. The main conclusions are drawn in section 6, as well as policy implications, further research lines and study limitations.

2. Literature review and hypothesis development

The evolution of the entrepreneurial dynamic in Portugal, or any other country, can be explained in light of the behaviour of many variables. As reported by Acs and Stough (2008), the public policies followed in a given country directly influence its entrepreneurial activity.

Factors such as taxation, labour market regulation, education, innovation, access to financing, and bureaucracy, among others, are repeatedly cited as instruments that policymakers have available, directly or indirectly, to make them more attractive and thus foster internal business dynamics. Audretsch et al. (2007) and Acs and Stough (2008) emphasise the relevance of public

policies in the entrepreneurial activity of nations, especially in the manner they handle the above-mentioned factors.

The literature has shown the importance of the level of economic development in explaining entrepreneurial activity. Wennekers et al., (2008) and Reynolds et al. (2003) conclude that the factors affecting it are different in developed and developing countries. According to the authors, factors such as immigration, historical growth rates, education, and innovation have a greater influence in developed countries, whereas the size of the informal economy and the quality of institutions play an important role in the emergence of entrepreneurial activity in developing countries.

Mata (1996) and Ilmakunnas and Topi (1999) specifically address the influence of macroeconomic factors on the emergence of companies in a given country or region. The first study emphasises the importance of aggregate demand and gross domestic product (GDP) in the birth of new companies, while the second highlights industrial growth, unemployment, interest rates, access to credit, and GDP as macroeconomic factors that influence the birth of companies.

At the economic level, the countries' different levels of entrepreneurial activity cannot be dissociated from the stages of development of the economies in question (Freytag & Thurik, 2007) and are therefore determinants to explain entrepreneurial activity (Carree et al., 2007).

According to Galindo and Méndez (2014), entrepreneurial activity is more dynamic in periods of economic growth, consistent with the new business opportunities in these periods. Naudé and MacGee (2009) argue that conversely, recession and deceleration of growth in developed economies reduce economic opportunities, leading to an increase in the rate of business failure and fewer entrepreneurial initiatives in this period. Given that an important part of Keynesian thinking concerns the relevance of the role of expectations in decision-making, specifically in the realm of entrepreneurship and in the context of crisis, Marcua et al. (2012) state that psychological factors significantly affect the entrepreneurial tendency of the individual and are even more relevant than the initial capital needed to start a new business. However, the relationship found between entrepreneurial activity and economic growth seems to be different from study to study. Some authors report an inverse relationship between per capita gross domestic product and entrepreneurial activity (Stel et al., 2005), others partially verify this relationship by describing a convex curve (Acs et al., 1994), and other authors even report a direct relationship between the variables (Baba, 2011).

In fact, as suggested by Acs and Szerb (2007), there is a direct relationship between entrepreneurial activity and economic growth in developed countries and an inverse relationship between the two variables in developing countries. In light of this, since Portugal is considered as a developed country, we can establish the following hypothesis:

Hypothesis 1: In the Portuguese context, economic growth increases overall/sectoral entrepreneurial activity.

If economic activity determines the entrepreneurial dynamics of a country, the financing of the economy, and the conditions on which it is based, then it has a particular effect on the entry and exit of companies in the market (Ilmakunnas & Topi, 1999). Thus, both the supply of credit in the economy and the real interest rate have an actual effect on the entry and exit flow of companies in the market (Kashyap & Stein, 1994; Sun & Im, 2015), and together with other constraints of the financial system, they can function as obstacles to the development of entrepreneurial activity (Nawaser et al., 2011). In Russia, Chernopyatov et al. (2018) also consider that high interest rates rise significantly the barriers to entrepreneurial activity. Therefore, the following hypothesis can be tested for Portugal:

Hypothesis 2: In the Portuguese context, an increase in real interest rates reduces overall/sectoral entrepreneurial activity.

Regardless of the growth in the economy and the financing policy that supports it, the way in which the local economy relates to external agents may also determine the country's entrepreneurial activity. Borensztein et al. (1998) suggest that foreign direct investment (FDI) can make a positive contribution to the economic growth of the destination country if the country has a stock of human capital capable of absorbing potential technological advances resulting from the FDI. In this vein, Ayyagari and Kosova (2010) argue, more specifically, that FDI fosters the emergence of newly created companies in the domestic market, thereby contributing favourably to entrepreneurial activity. Under certain circumstances, Goel and Saunoris (2017) also show that FDI fosters the emergence of newly created companies in the domestic market. In turn, the transfer of knowledge inherent to FDI may play an important role in the entrepreneurial activity of the destination country (Acs et al., 2007), which culminates in the creation of new companies that generate economic growth (Young et al., 1994). All these allow us to challenge the validity of the next hypothesis:

Hypothesis 3: In the Portuguese context, an increase in FDI (inward flow) fosters overall/sectoral entrepreneurial activity.

Furthermore, the results obtained by Borensztein et al. (1998) indicate that FDI may have a more marked effect on a country's economic growth than its domestic investment, in the same manner that, from a crowding-out perspective, an increase in FDI may lead to a decrease in domestic investment (Munemo, 2014). The crowding-out effect may also occur in the sphere of public or private investment because the increased public investment may lead to a decrease in private investment, as suggested by Wai and Wong (1982). However, although many crowding-in examples are referenced in the literature, Erden and Holcombe (2005) observe the crowding-out effect in developed countries and the crowding-in effect in developing countries. Therefore, observing the crowding-out effect in Portugal would mean that public investment is harmful to private investment and thus to entrepreneurship. Put another way, less state involvement will yield more opportunities for the private sector and lead to an increase in entrepreneurial activity (Bjørnskov & Foss, 2008). This leads us to the following hypothesis:

Hypothesis 4: In the Portuguese context, an increase in public investment reduces overall/sectoral entrepreneurial activity.

Regarding the labour market, the relationship between unemployment and entrepreneurial activity seems somewhat ambiguous (Baptista & Preto, 2007). Rising unemployment can serve as a stimulus for the creation of new businesses; Reynolds et al. (1995) and Koellinger and Thurik (2012) confirm that the entrepreneurial cycle is positively affected by the national unemployment cycle. However, unemployment itself may determine entrepreneurial activity (Audretsch et al., 2006), even though, relative to other OECD countries, Portugal is observed as an outlier in the relationship between entrepreneurship and unemployment (Baptista & Thurik, 2007) due to the differences in macroeconomic fluctuations associated to European business cycles and to the adjustment costs to new technologies. In this vein, some empirical studies (Røed & Skogstrøm, 2014; Von Greiff, 2009) have shown that unemployed individuals are much more likely to start a new business than those who have a job. In Portugal, increased unemployment has been seen to boost entrepreneurial activity in subsequent periods (Baptista & Preto, 2007)—known as the *push* movement from unemployment to entrepreneurship. Thus, job generation may determine the subsequent creation of new businesses and entrepreneurship due to the prior satisfaction of the need for subsistence by obtaining a job. To shed light on this issue, we test the following hypotheses:

Hypothesis 5a: In the Portuguese context, an increase in unemployment has a positive effect on overall/sectoral entrepreneurial activity.

Hypothesis 5b: In the Portuguese context, an increase in employment reduces overall/sectoral entrepreneurial activity.

Another factor that can negatively influence entrepreneurial activity is the level of taxation in a given country, as confirmed by Bohatá and Mládek (1999) in the Czech Republic. According to Balamoune-lutz and Garelo (2014, p. 166), “new or higher tax burden could [...] constitute an impediment to entrepreneurship, growth, employment and tax revenues”. In fact, as described by Djankov et al. (2010), the effective corporate tax rate has a largely adverse impact on entrepreneurial activity, in addition to investment and FDI. Along these lines, Zhu et al. (2012) confirm the tax burden as one of the barriers of innovation in China. As concluded by Aidis (2005) in Lithuania, some significant barriers for business investment are formal barriers related to frequent changes in taxes, the tax level or the ambiguity of tax policies. Lee and Gordon (2005) linked economic growth to entrepreneurship and found that corporate tax rates negatively affect entrepreneurial activity. Similarly, Cullen and Gordon (2007, p. 1501) confirm that “a small increase in entrepreneurial risk taking in response to a cut in corporate tax rates”. Overall, considering a wide range of countries, corporate income taxation affects the entrepreneurial activity (Block, 2016). To sum up, corporate taxes could be viewed as a barrier to entrepreneurial activity, and this is an empirical matter to test for Portugal in two ways:

Hypothesis 6a: In the Portuguese context, an increase in the tax burden has a negative effect on overall/sectoral entrepreneurial activity.

Hypothesis 6b: In the Portuguese context, an increase in public fiscal revenue (taxes and social security) has a negative effect on overall/sectoral entrepreneurial activity.

The pecuniary nature of the variables cited so far is evident. However, entrepreneurship—which is understood to be a dynamic process of vision, change, and creation (Kuratko, 2013)—can be influenced by other (non-pecuniary) factors that can contribute to the process described. According to endogenous growth theory (Lucas, 1988; Romer, 1986), education and innovation are variables that may explain the entrepreneurial phenomenon. In fact, as mentioned by Lee and Rogoff (1997, p. 99), “education helps entrepreneurs” insofar as higher levels of education lead to higher success rates for new start-ups and higher growth rates according to Robinson and Sexton (1994). On the other hand, education focused on entrepreneurship has stronger relationships with subsequent entrepreneurial activity (Nabi et al., 2017; Walter & Block, 2016). To address the validity of this hypothesis we test whether:

Hypothesis 7: In the Portuguese context, an increase in the education level boosts overall/sectoral entrepreneurial activity.

‘Empirical studies have also sometimes failed to distinguish between service and manufacturing activities. This raises a question about the generalisability of prior research findings’ (Dana, 2004, p. 738). Due to the different types of entrepreneurial businesses, i.e. manufacturing or services (Banastao & Frias, 2008), they should be analysed separately. For example, there are effective differences between the innovation process when implementing quality systems in these two sectors (Ettlie & Rosenthal, 2011; Prajogo, 2005), as the innovation models in the services sector are literally different from those used in the industrial sector (Devece et al., 2011). Multiple variables were intentionally tested to determine which ones could influence entrepreneurial activity in the industrial sector and which in the services sector. There is a vast body of work that suggests fundamental differences between the industrial sector and the services sector both structurally and in the growth dynamics (Amin, 2009). Therefore, an interesting question to address is the following:

Hypothesis 8: In the Portuguese context, the variables that influence entrepreneurial activity in the industrial sector differ substantially from those that influence entrepreneurial activity in the services sector.

It is known that contingency factors affect entrepreneurial activity (Hitt et al., 2001) and “high regional presence of large-scale firms negatively affects entrepreneurship, due to low levels of human capital and entrepreneurial skills, fewer opportunities for entry and entrepreneurship inhibiting formal and informal institutions” (Stuetzer et al., 2016, p. 52). Moreover, the characteristics of the business environment are considered crucial to entrepreneurship (Alvarez et al., 2011; Ardagna & Lusardi, 2010). Hence, according to data on the Portuguese economy for 2015, the weight of the service sector in the national economy in terms of gross value added is approximately 76% and, in terms of employment, it is 68% of the national total (AICEP, 2016). In other words, there is a clear predominance of the services sector in the national economy, and one would expect that the determinants of entrepreneurial activity to be similar overall and at the services level. Thus, in line with the contingency approach, we suggest the following hypothesis:

Hypothesis 9: In the Portuguese context, the determinants of entrepreneurial activity in general are similar to the determinants of entrepreneurial activity in the services sector.

3. Methods

3.1. Research setting

The research process described below strives to shed light on the influence of macroeconomic variables on overall and sectoral entrepreneurial activity in Portugal using an exploratory perspective. After defining three time series models, it is important to analyse which variables can be integrated into each of these models, which methodological procedures to adopt, and the specification of the models in question.

Due to the lack of GEM data, prior care was required to elaborate a more extensive time series supported by the demographic analysis of companies in Portugal and the selection of a variable that could measure entrepreneurial activity in the country.

According to the OECD (2014), when analysing entrepreneurship it is important to focus on the dynamics triggered by the entrepreneurial phenomenon in the economy rather than using just the ‘creation of new companies’ indicator or on any other single measure. Fooladi and Kayhani (2003) note that entry of new companies in the market should not be considered as a measurement of entrepreneurial activity; however, the combination of the two variables suggested by the OECD (newly created companies and dissolved companies) permits the evaluation of the balance of entrepreneurial activity in a given year from a Schumpeterian perspective.

Using data provided by Statistics Portugal (*Instituto Nacional de Estatística—INE*), the ratio of newly created companies to dissolved companies in a given year will be established, thus allowing us to determine the average number of companies created annually to each dissolved company—a measure recently used by Aparicio et al. (2018) for the same purpose. If, for example, a ratio of three is found in a given year, it means that on average three new companies were created for each company that left the market in that year. Alluding to the “creative destruction” process referred to by Schumpeter as opposed to the use of other indicators (newly created companies or net newly created companies), this indicator gives us a perception of the dynamics and business regeneration in Portugal; therefore and according to OECD (Lunati et al., 2010) it is a valid indicator in the measurement of national entrepreneurial activity.

Given that there are sectoral data for industry and the services sector in addition to data on the Portuguese economy as a whole, it is possible to differentiate overall entrepreneurial activity from that of industry and the services sector. Data provided by the INE allow us to define the overall entrepreneurship ratio (OER), the industry entrepreneurship ratio (IER), and the services sector entrepreneurship ratio (SER). Summary statistics about these ratios can be seen in the Appendix.

3.2. Variable selection and model specification

The aforementioned multidisciplinary concept of entrepreneurship implies integrating various determinants that explain this phenomenon. Despite insufficient data to include institutional variables in a broader time-series interval, based on the literature review, a number of macroeconomic variables were selected that are directly or indirectly related to the formulated research hypotheses and were tested to explain the entrepreneurial activity in Portugal between 1986 and 2017.

According to Groebner et al. (2011), this sufficiently large sample size (greater or equal to 30 periods) allows to accomplish the Central Limit Theorem. The structural difference between the industrial sector and the services sector dictated the inclusion of additional explanatory variables that could have a distinct influence on the entrepreneurial activity of each sector (Table 1).

The stepwise regression method was chosen to specify our models, as adopted in other entrepreneurship studies (Shepherd & Zacharakis, 2018; Staniewski, 2016). It assumes a sequential fitting process through successive iterations that are confirmed at each step by the nested model test for each of the explanatory variables. Given the number of variables to be studied, the backward modality was chosen, in line with other recent entrepreneurship studies (Espinoza et al., 2019; Zamfir et al., 2018). This procedure is justified by the multidisciplinary nature of the entrepreneurship concept, and therefore it was decided to include all the above mentioned explanatory variables (supported by the formulated hypotheses) for their sequential elimination when the absence of statistical significance is observed—via the *F* test—in the explanation of the dependent variables of each of the models.

Consequently, after eliminating some of the variables, three models emerge for Portugal which seek to test the impact of the macroeconomic factors on entrepreneurial activity both overall (Model 1) and in sectoral (Models 2 and 3) terms. Based on the selection of the explanatory variables by the methodology described, a set of models is specified that enables us to obtain robust statistical results so that valid conclusions can be drawn.

The estimation of the models assumes a lin-lin specification between variables expressed in first differences to prevent an eventual nonstationarity in time series, as argued by Dickey and Pantula (1987). Thus, the estimations performed allow us to determine the absolute incremental impact of the regressors on the absolute increment of the entrepreneurial activity between 1986 and 2017: overall (OER—model 1), in the industry (IER—model 2), and in the services sector (SER—model 3).

Model 1:

$$\Delta OER_t = a_0 + a_1 \Delta Si_t + a_2 \Delta Pubiv_t + a_3 \Delta Esec_t + a_4 \Delta Pte_t + a_5 \Delta Gdp_t + u_t \quad (1)$$

where Δ is the first-difference operator used for each variable.

For Model 1, considering the variable measuring overall entrepreneurship (OER), inverse relationships are expected for *Si* (State income), *Pubiv* (Public investment), *Esec* (Employment in the secondary sector), and *Pte* (Part-time employment), whereas a direct relationship is expected with *GDP*, as suggested by the literature review.

Model 2:

$$\Delta IER_t = b_0 + b_1 \Delta Ss_t + b_2 \Delta Tiv_t + b_3 \Delta Educ_t + b_4 \Delta Rce_t + b_5 \Delta Ltrir_t + b_6 \Delta Gni_t + b_7 \Delta E_t + v_t \quad (2)$$

where Δ is the first-difference operator used for each variable.

For Model 2, considering the variable measuring entrepreneurship in the industry (IER), inverse relationships are expected for *Ss* (State spending), *Ltrir* (Long-term interest rates), *Rce* (Real

Table 1. Explanatory control variables

Variable and acronym	Unit	Source
Total employment (E)	Thousands	AMECO
Long-term real interest rate (Ltrir)	Rate (%)	
GDP at constant prices of 2005 (Gdp)	Mrd euro	
Gross national income (Gni)	Mrd euro	
State spending in real terms (Ss)	Index (National currency: 2005 = 100)	
State income (Taxes + Social Security) (Si)	Mrd euro	
Public investment at current prices (Pubiv)	Mrd euro	
Total investment at constant prices (Tiv)	Mrd euro	
Real compensation per employee (Rce)	Index (National currency: 2005 = 100)	
Employment in the secondary sector (Esec)	Thousands	INE, PORDATA
Employment in the tertiary sector (Eter)	Thousands	
Part-time employment (Pte)	Thousands	
Education (Enrolment rate for secondary education) (Educ)	Rate (%) of population	DGEEC/MEC; INE, PORDATA
Foreign direct investment, inward flow (Fdi)	Millions US Dollars at current prices	UNCTAD
Tax burden (Tb)	Rate (%)	INE-BP, PORDATA

Source: Prepared by the authors based on AMECO,³ INE,⁴ PORDATA,⁵ DGEEC/MEC,⁶ OECD,⁷ UNCTAD,⁸ BP.⁹

compensation per employee), and E (Employment), whereas direct relationships are expected for Tiv (Total investment), Educ (Enrolment rate for secondary education), and Gni (Gross national income).

Model 3:

$$\Delta SER_t = \gamma_0 + \gamma_1 \Delta Si_t + \gamma_2 \Delta Pubiv_t + \gamma_3 \Delta Esec_t + \gamma_4 \Delta Gdp_t + \gamma_5 \Delta Ss_t + \gamma_6 \Delta Tb_t + w_t \quad (3)$$

where Δ is the first-difference operator used for each variable.

For Model 3, which refers to the variable measuring entrepreneurship in the services sector (SER), inverse relationships are expected for Si (State income), Pubiv (Public investment), Esec (Employment in the secondary sector), Ss (State spending), and Tb (Tax burden), whereas a direct relationship is expected with GDP.

The specified models enable an overall and sectoral explanation of the absolute increment in entrepreneurial activity in Portugal through the absolute increment, in the same period, of their various determinants or explanatory variables. The error terms u_t , v_t and w_t are assumed to have the usual “white noise” properties, that is, they are all identically and independently distributed with zero mean and constant variance.

Summary statistics are available in the Appendix. Therefore, as for coefficients of asymmetry (Skewness) and kurtosis (Ex. kurtosis), none of the variables presents values that indicate violations of the normal distribution, according to the reference values defined by (Kline, 2011).¹ With respect to the percentiles and interquartile range, the ratio values are very similar.

4. Results

Given the specification of the referred models (1, 2, and 3), the results were obtained after the following estimations (Table 2).

It should be noted that given the levels of statistical significance and the diagnostic tests (heteroscedasticity, autocorrelation, and specification), the results obtained are satisfactory and enable validation of the set of inferences that follow.

Model 1 of Table 2 allows the following conclusions to be drawn. Regarding the overall entrepreneurial activity in Portugal, inverse relationships are found between entrepreneurial activity and state income, public investment, and employment; however, there is a direct relationship with GDP.

In fact, the empirical evidence from the estimation of Model 1 indicates that one unit increase in GDP causes an increase of 0.75035 units in the variation of the overall entrepreneurship ratio (OER) in Portugal when everything else remains constant. Consequently, the initial expectation of a direct

Table 2. Entrepreneurship in Portugal and its determinants, 1986–2017

Variables	(OER) Overall entrepreneurship ratio (Model 1)	(IER) Industry entrepreneurship ratio (Model 2)	(SER) Services entrepreneurship ratio (Model 3)
Constant	-1.51491*** (0.0006)	3.46192*** (0.0014)	-2.06619*** (5.19e-05)
State income (Taxes and Social Security) (Si)	-0.21502* (0.0878)	—	-0.53553*** (0.0002)
Public investment (Pubiv)	-1.54285*** (0.0002)	—	-2.24534*** (0.0002)
Employment in the secondary sector (Esec)	-0.01992*** (8.02e-06)	—	-0.02669*** (62.06e-011)
Part-time employment (Pte)	-0.01899*** (0.0029)	—	—
GDP at constant prices (Gdp)	0.75035*** (7.04e-06)	—	0.69240*** (1.08e-09)
State spending in real terms (Ss)	—	-0.71595** (0.0480)	0.40466*** (0.0004)
Total investment (Totiv)	—	-1.95107** (0.0356)	—
Education (Educ)	—	0.795914** (0.0234)	—
Real compensation per employee (Rce)	—	0.981767* (0.0981)	—
Long-term real interest rate (Ltrir)	—	-0.370500* (0.0786)	—
Gross national income (Gni)	—	1.41949 *** (0.0021)	—
Total Employment (E)	—	0.033781** (0.0438)	—
Tax burden (Tb)	—	—	1.14477*** (0.0003)
R2	0.68	0.62	0.75
Heteroscedasticity (White's test)	P(Chi-square(20) > 22.251339) = 0.327030	P(Chi-square(14) > 12.374305) = 0.576271	P(Chi-square(27) > 27.831792) = 0.419685
Autocorrelation test (LMF)	P(F(1,24) > 0.220641) = 0.643	P(F(1,22) > 0.858356) = 0.364	P(F(1,23) > 2.70743) = 0.113
Specification (RESET Test)	P(F(2,23) > 0.463957) = 0.635	P(F(2,21) > 1.02057) = 0.378	P(F(2,22) > 0.112174) = 0.894

Notes: numbers between parentheses denote the p-values of the respective statistics;

***, **, * indicate the statistical significance of the coefficient at the 1%, 5%, and 10% level, respectively.

relationship between the two variables is confirmed—a favourable climate of economic growth is conducive to entrepreneurship.

Conversely, it can be observed that in Portugal, an increase of one unit in state income (from taxes and social security) or a unit increase in public investment is associated with 0.21502 and 1.54285 unit decrease in OER, respectively. These findings confirm the initial expectation of an inverse relationship between the taxes collected (state income from taxes and social security) and entrepreneurship and an inverse relationship between public investment and entrepreneurship, in line with the crowding-out hypothesis (more state intervention less private participation in the economy).

In turn, if we consider the relationship between the labour market and entrepreneurship, the results confirm the inverse relationship (initially expected) between employment and entrepreneurship; that is, increased employment contributes to decreased entrepreneurial activity in Portugal. In fact, in this domain, the results from the estimation of Model 1 demonstrate that employment has a negative impact on overall entrepreneurship—there is a negative reaction of 0.01992 and 0.01899 units of the OER in Portugal caused by a unit increase in “secondary sector employment” and “part-time employment”, respectively.

The results from Model 2 are also shown in Table 2 and indicate which IER determinants are statistically significant. In this particular case, an inverse relationship is observed between the IER and real state spending, total investment, and the real interest rate, whereas the IER has a direct relationship with education, GNI, and employment. All marginal effects are statistically significant at the conventional 5% and 1% levels. The interpretation of the estimated coefficients is analogous to that of Model 1.

Referring to Model 3, the estimation confirms an inverse relationship between the entrepreneurship in the services sector (SER) and state income, public investment, and employment in the secondary sector; and a direct relationship between the SER and GDP, real state spending, and the tax burden (tax revenue as a % of GDP). The next section explains these relationships in terms of the initial hypotheses.

To ensure the robustness of the results we use first differences in all variables assigning this way the following features: dynamic aspects are introduced to the estimated equations taking into account time-lag effects; first differences are usually stationary avoiding therefore spurious relationships; through the diagnostic tests it is shown that error autocorrelation is not present (LM test) and the model specification is correct (RESET test). All these aspects ensure the reliability of the regression results.

5. Discussion

The above exploratory study of the determinants of entrepreneurial activity in Portugal—though not all of the list of variables tested to explain the entrepreneurial activity in Portugal were as expected—reveals that the vast majority of the coefficients have the initially expected signs.

According to our results, hypothesis 1 (H1), namely that GDP can have a positive influence on overall/sectoral entrepreneurial activity, cannot be rejected for the overall (OER) or services sector (SER) entrepreneurship; this is in line with Galindo and Méndez (2014) who detect that a greater entrepreneurial activity is observed in periods of economic growth due to new business opportunities in these periods. Although no relationship is verified between industry entrepreneurship (IER) and GDP, a direct (positive) relationship is observed between IER and GNI. As the main difference between GNI and GDP is in the accounting of the FDI values² (not observing the FDI’s statistical significance for the explanation of the IER), the justification for this positive impact is analogous to that of GDP. Consequently, the industry also has a greater entrepreneurial activity in Portugal during periods of economic growth, consistent with the manifest perception of new business opportunities in periods of expansion (Galindo & Méndez, 2014).

Concerning hypothesis 2 (H2), given that interest rates can affect negatively the entrepreneurial activity (overall/sectoral), no statistical evidence is observed in terms of either the overall (OER) or

the services (SER) entrepreneurship. However, hypothesis 2 cannot be rejected in relation to industry entrepreneurship (IER); that is, an increase in the real long-term interest rate negatively affects entrepreneurial activity in the industry. This peculiarity may have something to do with the greater sensitivity of some industrial units to the interest rate (Suyuan et al., 2015) given that the amount of financing required in this sector can be much higher than in other economic activities, and the conditions on which it is based have a particular effect on the entry and exit of companies in the market (Ilmakunnas & Topi, 1999).

Turning to hypothesis 3 (H3), we are unable to draw any conclusions given the assumption that FDI can have a positive influence on overall/sectoral entrepreneurial activity. The FDI variable was not found to be statistically significant in explaining the overall and sectoral entrepreneurial activity, which is line to the findings of Eren et al. (2019).

Hypothesis 4 (H4) refers to the potential harmful effect of public investment on overall/sectoral entrepreneurial activity (known as the crowding-out effect). This cannot be rejected in the case of the overall (OER) and services (SER) sectors. That is, increased public investment is shown to be detrimental to entrepreneurial activity in Portugal, both in the overall and services sector, thus confirming the crowding-out effect. This is in line with the conclusions drawn by Wai and Wong (1982) and Erden and Holcombe (2005). However, the case of entrepreneurship in services (SER) has a peculiarity (in comparison to the overall case) that is also explained by the fact that public expenditure has a significant positive impact on generating higher entrepreneurial activity in this sector. Therefore, the results suggest that there are two opposed forces at work in the services sector: despite the negative effect of public investment on SER (the crowding-out effect), a part of this result is compensated for by the positive effect that public expenditure has on SER (the crowding-in effect). Specific features of economic policy in Portugal may help to explain the direct relationship between public spending and entrepreneurial activities in services and therefore the crowding-in effect reported. These include the constitution of public-private partnerships, the transfer of public money to the financial sector, and the subsidising of jobs and internships for young graduates. We could emphasise here the state's role as an element of economic dynamism (Miller et al., 2012), which contributes to the creation of better conditions for companies and the reduction in business costs, and therefore confirms the complementary function between public and private capital, as argued by Leleux and Surlemont (2003).

No conclusions can be drawn for hypothesis 5a (H5a), namely that unemployment can have a positive effect on overall/sectoral entrepreneurial activity because the unemployment variable is not statistically relevant to explain the overall or sectoral entrepreneurial activity.

In the case of hypothesis 5b (H5b), more specifically that employment can have a negative effect of on overall/sectoral entrepreneurship, there is statistical evidence in support of this hypothesis for the OER and SER. The increase in employment in the secondary sector and in part-time employment is found to contribute negatively to overall entrepreneurial activity. In turn, increased employment in the secondary sector—industrial units typically absorb more wage earners—leads to less entrepreneurial activity in the services sector. These results confirm the inverse relationship between employment and entrepreneurship because an employed person is less likely to start a new business than someone unemployed (Andersson & Wadensjö, 2007; Røed & Skogstrøm, 2014; Von Greiff, 2009).

Hypothesis 6a (H6a) posited that an increase in the tax burden would have an adverse effect on overall and sectoral entrepreneurial activity. This hypothesis is rejected with respect to the services SER sector since the impact is found to be positive. However, we are unable to draw any conclusions in relation to the OER or IER sectors as the impact of this variable is not significant. In other words, it is not confirmed that the increase in the tax burden is harmful to entrepreneurial activity in the services sector, and there is no statistical evidence to draw any conclusion about the overall or industrial entrepreneurial activity. These findings do not confirm the negative effect of the tax burden on entrepreneurial activity described by Balamoune-lutz and Garelo (2014).

Hypothesis 6b (H6b), i.e. an increase in the state's tax revenues harms overall and sectoral entrepreneurial activity, cannot be rejected for the overall (OER) and services (SER) sectors. In other words, an increase in the state's tax revenues from people or business is an obstacle to entrepreneurship in overall and the services sectors. This finding partially corroborates the claim of Djankov et al. (2010) that increasing the effective corporate tax rate has a largely adverse impact on entrepreneurial activity because taxation may affect the decision to start a business (De Mooij, 2007). In conclusion, an unexpected direct relationship (H6) is observed between the tax burden and the SER sector, despite an expected inverse relationship between fiscal revenue and the SER (H6b). There is an apparent paradox in the tax variables that explain the SER sector. When the tax burden is excessive, it can be detrimental to tax revenue. As mentioned by Balamoune-lutz and Garelo (2014), a new or higher tax burden may be an impediment to the collection of more tax revenue. In other words, although there is no justification for the direct relationship between the tax burden and the SER sector, there may not be a conflicting relationship between SER and the tax burden and tax revenue.

Hypothesis 7 (H7) predicts that a higher level of education fosters overall/sectoral entrepreneurial activity. In light of the results shown in Table 2, this hypothesis cannot be rejected for the industry IER sector. Education has a positive role in the entrepreneurial activity of the industrial sector, thus satisfying the affirmation of some authors that "education helps entrepreneurs" (Lee & Rogoff, 1997, p. 99) and the claim by Robinson and Sexton (1994) that higher levels of education lead to higher success rates for new start-ups as well as higher growth rates.

According to hypothesis 8 (H8), the variables that influence entrepreneurial activity in the industrial sector (IER) differ from those in the services sector (SER). The results show that the determinants are quite different in the two sectors; for example, the coefficients have different signs for the "state spending" variable. This finding may be indirectly related to differences in the innovation processes (Ettlie & Rosenthal, 2011) or the innovation models (Devece et al., 2011) between the two sectors.

Hypothesis 9 (H9), namely that there are similar determinants for the overall and services sector entrepreneurial activity in Portugal, cannot be rejected. In fact, after testing several factors, the variables that affect overall and services sector entrepreneurship were found to be similar. This expected result can be explained by the strong dependence of the Portuguese economy on the services sector. In 2015, the services sector's share of gross value added in the total activity in Portugal was approximately 76%, and it accounted for 68% of total employment (AICEP, 2016).

To sum up, special emphasis should be given to the similarities between variables that affect entrepreneurship overall and in the services sector; entrepreneurship in the industry sector is clearly a separate case in this domain. Given these sectoral differences, further analysis of the results reveals specific trends in the determinants of entrepreneurship in industry and the services sector. Whereas entrepreneurship in the industry tends to have more structural determinants (i.e. long-run determinants), conjunctural determinants (i.e. related to short-run variables) seem to prevail in the services sector.

6. Conclusion

This study allowed us to identify the macroeconomic variables that most influence entrepreneurial activity in Portugal. Generally speaking, similar macroeconomic variables influence entrepreneurial activity in the services sector (in the same direction) and the overall entrepreneurial activity in Portugal. This may be explained by the heavyweight of the services sector in the country's overall economic activity. However, the macroeconomic variables that influence entrepreneurial activity in the industry are radically different. This study helps decode pathways to increase entrepreneurial activity in Portugal by assessing critical information that can support the decision-making of the political agents in this area. Acs and Mueller (2008) suggest that research about conditions to create new companies could influence a debate about how governments can facilitate and stimulate the creation of enterprises.

Moreover, the aim of this study is to act as the starting point for further research not only focused on the determinants of overall entrepreneurship but taking into account the specific

economic sectors; academics, as well as policymakers, should be aware of these idiosyncrasies in this domain. We leave this promising avenue of research to the future, which implies differentiate the determinants of entrepreneurship from industry to services sector. This relatively narrow focus offers to the desirable studies about sustainable entrepreneurship a plausible reason to having in mind this particular sectoral distinction.

Given that the determinants of entrepreneurship in the industry seem to follow a structural trend (i.e. prevalence of long-run determinants) and that those of the services sector seem to have a conjunctural pattern (i.e. related with short-run variables), policymakers should reflect deeply on refurbishing the national strategy for entrepreneurship for the different sectors: primary sector, secondary sector, and tertiary sector of the economy.

The limitations of this study result from the lack of available data and the large number of indicators that can measure entrepreneurial activity (Lunati et al., 2010); moreover, as the scope of the study was restricted to the macro (country) level, the micro (company) level referring to corporate entrepreneurship or intrapreneurship was not analysed.

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Notes

1. |Skewness| >3 (severe asymmetry) or values of |Ex. kurtosis| >10 (severe kurtosis) and |Ex. kurtosis| >20 (very severe kurtosis).
2. GDP measures the wealth obtained within Portuguese territory (either by residents or non-residents), whereas gross national income (GNI) focuses on the results recorded (in Portugal or abroad) by the people who actually live in Portugal. The income obtained by a foreign multinational through a direct investment that has been made in Portugal is accounted for in the calculation of the GDP but not in the national income.
3. AMECO—Annual macro-economic database of the European Commission's Directorate-General for Economic and Financial Affairs.
4. INE—*Instituto Nacional de Estatística* (Statistics Portugal).
5. PORDATA—Database of Contemporary Portugal, organized and developed by the Francisco Manuel dos Santos Foundation.
6. DGEEC/MEC—*Direção Geral de Estatísticas da Educação e Ciência/Ministério da Educação* (Portuguese General Directorate of Statistics from Education/Ministry of Education).
7. OECD—Organisation for Economic Co-operation and Development.

8. UNCTAD—United Nations Conference on Trade and Development.

9. BP—*Banco de Portugal* (Central Bank of the Portuguese Republic).

correction

This article has been republished with minor changes. These changes do not impact the academic content of the article.

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Appendix. Summary Statistics, using the period 1986–2017

Variable	Mean	Median	Minimum	Maximum
OER	7.571	6.664	0.686	19.404
IER	7.647	7.175	0.648	19.413
SER	7.608	6.494	0.717	21.620
Total employment	4674.786	4624.101	4212.344	5048.215
Long-term real interest rate	3.267	3.204	-2.101	10.715
GDP at constant prices of 2005	125.499	131.537	78.683	157.802
Gross national income	122.946	130.631	74.075	152.793
State spending in real terms	75.415	75.997	37.847	111.961
State income	33.679	33.731	2.954	61.353
Public investment	3.507	3.906	0.553	6.399
Total investment	27.959	27.600	14.788	39.148
Education	46.827	57.717	12.078	72.864
Real compensation per employee	81.164	88.756	49.150	99.000
Employment in the secondary sector	1486.247	1495.296	1039.203	1724.283
Part-time employment	459.791	531.234	241.362	658.350
Tax burden	17.857	18.860	13.266	20.988
Variable	Std. Dev.	C.V.	Skewness	Ex. kurtosis
OER	5,809	0,748	0,465	-0,984
IER	5,821	0,746	0,333	-1,069
SER	5,954	0,767	0,636	-0,599
Total employment	270,142	0,056	0,077	-1,388
Long-term real interest rate	2,680	0,804	0,948	1,427
GDP at constant prices of 2005	28,263	0,221	-0,452	-1,242
Gross national income	27,635,837	0,222	-0,589	-1,077
State spending in real terms	23,138,465	0,303	-0,240	-1,231
State income	20,502,919	0,599	-0,086	-1,437
Public investment	1,887	0,528	-0,248	-1,361
Total investment	7,626	0,269	-0,212	-1,132
Education	20,149	0,425	-0,524	-1,177
Real compensation per employee	16,694	0,203	-0,672	-1,084
Employment in the secondary sector	158,380	0,105	-0,777	0,851
Part-time employment	143,957	0,309	-0,217	-1,591
Tax burden	2,280	0,126	-0,975	-0,313

(Continued)

(Continued)				
Variable	Mean	Median	Minimum	Maximum
Variable	5%	95%	IQ range	Missing obs.
OER	0,821	18,425	10,508	0
IER	0,671	18,579	10,694	0
SER	0,848	19,309	10,322	0
Total employment	4314,394	5091,936	543,431	0
Long-term real interest rate	-0,690	10,307	3,252	0
GDP at constant prices of 2005	79,363	159,075	49,072	0
Gross national income	75,032	153,611	46,696	0
State spending in real terms	38,516	109,060	45,527	0
State income	3,577	61,709	42,112	0
Public investment	0,597	6,073	3,538	0
Total investment	14,903	39,069	12,735	0
Education	13,263	72,302	34,621	0
Real compensation per employee	50,745	99,020	30,620	0
Employment in the secondary sector	1101,785	1723,253	193,762	0
Part-time employment	248,218	646,764	254,150	0
Tax burden	13,357	20,450	2,753	0



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