



Determinants of overall and sectoral entrepreneurship: evidence from Portugal

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DETERMINANTS OF OVERALL AND SECTORAL ENTREPRENEURSHIP: EVIDENCE FROM PORTUGAL

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Abstract

As a multidisciplinary concept, entrepreneurship can be explained by numerous factors. Therefore, 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, the novelty involving a cross-sectoral view of the entrepreneurial phenomenon fuels this challenge. For this purpose, we employ an estimation approach based on time series models to confirm (or reject) a diversity of hypotheses. The main results indicate that the determinants of entrepreneurship in industry are significantly different from the determinants of entrepreneurship in the service 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 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 for the sustainable development of entrepreneurial activity are suggested.

Keywords: entrepreneurship; sectoral entrepreneurship; determinants of entrepreneurship; entrepreneurial activity; business services; time series models.

JEL Classification: L26, O11, O14.

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1. Introduction

Given that sources of information in the area of entrepreneurial activity are scarce in Portugal, we can highlight some features that the latest report of the Global Entrepreneurship Monitor (GEM) reveals about the Portuguese reality. According to the source cited, in 2012, Portugal recorded a total entrepreneurial activity (TEA) rate of 7.7%; that is, for every 100 individuals in Portugal, there are 7 to 8 entrepreneurs who are involved in start-up processes or in the management of new businesses. Also according to the GEM report, in 2012, out of a total of 69 countries, Portugal ranked 44th in terms of the TEA rate; between 2001 and 2013, this rate varied between a minimum of 3.8% (2004) and a maximum of 8.8% (2007). Furthermore, the GEM study showed that in 2012, Portugal ranked 7th among a group of 24 innovation-oriented economies in terms of the TEA rate.

The scarcity of data regarding entrepreneurial activity in Portugal over a longer time period leads us to an analysis of the demographic evolution of companies in the country in an attempt to explore potential factors able to explain the entrepreneurial activity in Portugal.

The challenge presented aims to fill a gap in the field of entrepreneurship in Portugal; therefore, a multiplicity of (macroeconomic) determinants that can influence the entrepreneurial activity of the country will be explored, and the measurement of entrepreneurial activity will itself constitute a stimulus to research, despite the lack of data in this particular area. The novel character of this study 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 overall entrepreneurship at the country level, the contribution of this study is to differentiate entrepreneurship sectorally and study the specific determinants of entrepreneurship in industry and in the services sector. These problems have not been addressed yet in Portugal.

To achieve this objective, we organized the study into six main sections: In the literature review the relationships between macroeconomic variables and entrepreneurship are explained and important hypotheses are established which will be tested empirically. The methodology 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 are analysed objectively. The empirical findings are then discussed in the light of the literature review and the main conclusions are drawn in separate sections. The article ends with the main findings, policy implications and study limitations.

2. Literature review and hypotheses to test

The evolution of the entrepreneurial dynamic, in Portugal or in 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 policy makers have available, directly or indirectly, to increase their attractiveness and thus foster internal business dynamics. Audretsch, Grilo, and Thurik (2007) and Acs and Stough (2008) emphasize the relevance of public policies in the entrepreneurial activity of nations, especially in the manner they handle the cited factors. However, if a country's level of economic development is an important factor in explaining its entrepreneurial activity (Wennekers, Stel, Thurik, & Reynolds, 2008), it is natural that factors that may influence the entrepreneurial activity of a developed country do not have the same influence on the entrepreneurial activity of developing countries, and vice versa.

In fact, as Reynolds, Bygrave, and Autio (2003) conclude, the factors that affect the entrepreneurship level of economies are different in developed and developing countries. According to the authors, in developed countries, there is a greater influence of factors such as immigration, historical growth rates, education and innovation, whereas in developing countries, the size of the informal economy and the quality of institutions have an important role to play in the emergence of entrepreneurial activity.

In turn, Mata (1996) and Ilmakunnas and Topi (1999) specifically address the influences that macroeconomic factors have on the emergence of companies in a given country or region. The first study emphasizes the importance of aggregate demand and gross domestic product (GDP) in the birth of new companies, whereas the second highlights industrial growth, unemployment, interest rates, access to credit, and GDP as macroeconomic factors that influence the birth of companies. In turn, endogenous growth theories (Lucas, 1988; Nelson & Phelps, 1966; Romer, 1986) refer to the critical influence of human capital and technological innovation as decisive factors for economic growth and therefore for the creation of firms.

At the economic level, the different levels of entrepreneurial activity of countries cannot be dissociated from the stages of development of the economies in question (Freitag & Thurik, 2007) and are therefore determinants to explain entrepreneurial activity (Carree, Stel, Thurik, & Wennekers, 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. Similarly, Naudé and MacGee (2009) argue that conversely, recession and deceleration of growth in developed

economies reduces economic opportunities, which leads to an increase in the rate of business failure and causes less entrepreneurial initiatives to materialize in this period. If we hold 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, Iordanescua, and Iordanescua (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 between entrepreneurial activity and economic growth seems to behave differently from study to study. Some authors report an inverse relationship between per capita gross domestic product and entrepreneurial activity (Stel, Thurik, & Carree, 2005), but other authors partially verify this relationship by describing a convex curve (Acs, Audretsch, & Evans, 1994), and others 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. According to this, and since Portugal is considered as a developed country, we can establish the following hypothesis:

Hypothesis 1: 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 real effects on the entry and exit flow of companies in the market (Kashyap & Stein, 1994), and together with other constraints of the financial system, they can function as obstacles to the development of entrepreneurial activity (Nawaser, Khaksar, Shakhsian, & Jahanshahi, 2011). Therefore, the following hypothesis can be tested for Portugal:

Hypothesis 2: An increase of real interest rates reduces overall/sectoral entrepreneurial activity.

Regardless of the growth of the economy and the financing policy that supports it, how the local economy relates to external agents may also determine the country's entrepreneurial activity. Borensztein, De Gregorio, and Lee (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. In turn, the transfer of knowledge inherent to FDI may have an important role in the entrepreneurial activity of the destination country (Acs, O'Gorman, Szerb, & Terjesen, 2007), which culminates in the creation of new companies that generate economic growth (Young, Hood, & Peters, 1994). All these allow us to challenge the validity of the next hypothesis:

Hypothesis 3: An increase of FDI (inward flow) fosters overall/sectoral entrepreneurial activity.

Furthermore, the results obtained by Borensztein et al. (1998) indicate that FDI may have a more pronounced 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 increased public investment may lead to a decrease in private investment, as suggested by Wai and Wong (1982). However, although there are many crowding-in examples 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 will mean that public investment is harmful to private investment and thus to entrepreneurship. Put it in another way, less involvement by the state will yield more opportunities for the private sector and lead to an increase in entrepreneurial activity (Bjørnskov & Foss, 2008). This leads us to an additional hypothesis to test:

Hypothesis 4: An increase of 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, Miller, & Maki, 1995) and Koellinger and Thurik (2012) confirm that entrepreneurial cycle is positively affected by the national unemployment cycle. However, unemployment itself may determine entrepreneurial activity (Audretsch, Keilbach, & Lehmann, 2006), even if Portugal, in comparison with other OECD countries, is observed as an outlier in the relationship between entrepreneurship and unemployment (Baptista & Thurik, 2007). 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, it has been observed that increased unemployment increases entrepreneurial activity in subsequent periods (Baptista & Preto, 2007) — known as the *push* movement from unemployment in the face of 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 to this issue we can test the following hypotheses:

Hypothesis 5a: An increase of unemployment has a positive effect on overall/sectoral entrepreneurial activity.

Hypothesis 5b: An increase of 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 Czech Republic. According to Balamounelutz 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, Ganser, McLiesh, Ramalho, and Shleifer (2010), the effective corporate tax rate (known in Portugal as the 'IRC') has a largely adverse impact on entrepreneurial activity, in addition to investment and FDI. In this vein, Zhu, Wittmann, and Peng (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. 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 a twofold way:

Hypothesis 6a: An increase of tax burden has a negative effect on overall/sectoral entrepreneurial activity.

Hypothesis 6b: An increase of 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 obvious. 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. In light of

endogenous growth theory (Lucas, 1988; Romer, 1986), education and innovation may be two variables that explain the entrepreneurial phenomenon. In fact, as mentioned by Lee and Rogoff (1997: 99), "education helps entrepreneurs," insofar as, according to Robinson and Sexton (1994), higher levels of education lead to higher success rates for new start-ups and higher growth rates. To address the validity of this hypothesis we test whether:

Hypothesis 7: An increase of education level increases overall/sectoral entrepreneurial activity.

‘Empirical studies have also sometimes failed to distinguish between service and manufacturing activities. This raises a question about the generalizability of prior research findings’ (Dana, 2004: 738). As different types of entrepreneurial businesses exist, like manufacturing and services (Banastao & Frias, 2008), a proper way to deal with these assumptions is to separate manufacturing from services entrepreneurial activities. Regarding the differences between the industrial or manufacturing sector and the services sector, there are effective differences in the innovation process (Ettlie & Rosenthal, 2011) at the level of implementation of quality systems (Prajogo, 2005), as the innovation models in the services sector are literally different from those used in the industrial sector (Devece, Palacios-marques, & Fernandez, 2011). Multiple variables were intentionally tested to understand which of them could have an influence on entrepreneurial activity in the industrial sector and which variables could influence entrepreneurial activity in the services sector. There is a vast body of work that suggests fundamental differences — at the structural level and in the growth dynamics — between the industrial sector and the services sector (Amin, 2009). Therefore, an interesting question to address is the following:

Hypothesis 8: The variables that influence entrepreneurial activity in the industrial sector differ substantially from the variables that influence entrepreneurial activity in the services sector.

It is known that contingency factors have influence on entrepreneurial activity (Hitt, Ireland, Camp, & Sexton, 2001) and the significant role from industry structure on entrepreneurial activity (Stuetzer et al., 2016). Moreover, the characteristics of the business environment have been considered as a crucial factor for entrepreneurship (Alvarez, Urbano, Coduras, & Ruiz-Navarro, 2011; Ardagna & Lusardi, 2010). Hence, according to data from 2015 about the Portuguese economy, in terms of gross value added, the service sector's weight in the national economy 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 are similar at the overall level and at the services level. Thus, in line to the contingency approach, we suggest the following hypothesis:

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

The validity of the above established hypotheses will be tested in the following sections for the Portuguese economy.

3. Methodology and Measurement

The methodological aspects below seek to describe the research process, which aims to understand, from an exploratory perspective, the influence of macroeconomic variables on overall and sectoral entrepreneurial activity in Portugal. To fulfil this objective, three time series models were specified. Subsequently, it is important to analyse which variables can be integrated into each of these models, which methodological procedures are to be adopted, and the specification of the models in question.

The lack of GEM data for elaborating a more extensive time series required some prior care, supported by the demographic analysis of companies in Portugal, and the selection of a variable that could measure entrepreneurial activity in the country.

Thus, as the approach advocated by the OECD (2014), the analysis of entrepreneurship should focus not only on the use of the 'creation of new companies' indicator, or on any other single measure, but rather on the dynamics that the entrepreneurial phenomenon exerts on the economy. Consequently, the relative combination of two variables suggested by the OECD (newly created companies and dissolved companies) — which overcomes the barrier referred to by Fooladi and Kayhani (2003) that the exit of companies from the market is never considered in the measurement of entrepreneurial activity — enables, under a Schumpeterian perspective, the evaluation of the balance of entrepreneurial activity in a given year.

Using data provided by the Portuguese Institute of Statistics (*Instituto Nacional de Estatística - INE*), we propose the creation of a ratio between newly created companies and dissolved companies in a given year, which will allow us to determine the average number of companies created annually for each dissolved company. If, for example, a ratio of three is found in a given year, this will objectively

means that three new companies were created for each company that left the market during the year in question (on average). In allusion to the "creative destruction" process referred to by Schumpeter, to the detriment of the use of other indicators (newly created companies or net newly created companies), this indicator allows us to have a perception of the dynamics and business regeneration prevailing in Portugal; therefore, it is a valid indicator in the measurement of national entrepreneurial activity.

Given that in addition to overall data concerning the entire Portuguese economy, there are sectoral data related to industry and the services sector, it is possible to differentiate overall entrepreneurial activity from entrepreneurial activity in industry and entrepreneurial activity in the services sector. Thus, based on the data provided by the INE, the overall entrepreneurship ratio (OER), the industry entrepreneurship ratio (IER), and the services sector entrepreneurship ratio (SER) are created. Summary statistics about these ratios can be seen in Table 1.

(Insert Table 1 here)

According to Table 1 and considering the referred years, the values of the OER variable range from a minimum of 0.7 points in 2008 to a maximum of 19.8 points in 1992. The mean value is around 7.73 points. The higher the value of OER, the greater the number of new companies *per* each company that vanished in a specific year.

It can also be seen that the values of variable IER range from a minimum of 0.73 points (approximately) in 2008 to a maximum of 19.71 points (approximately) in 1990. The mean value is around 7.76 points. The higher the value of IER, the greater the number of creation of new industrial companies *per* each company of this sector that disappeared in a specific year.

Finally, the values of variable SER range from a minimum of 0.66 points (approximately) in 2009 to a maximum of 21.95 points (approximately) in 1992. The mean value is around 7.72 points. The higher the value of SER, the greater the number of creation of new companies in the services sector *per* each company of this sector that left the market in a specific year.

Concerning the dispersion values of these ratios, according to the Standard Deviation (Std. Dev.) or to the Coefficient of Variation (C.V.), the higher variability is shown by SER. Regarding to the coefficients of asymmetry (Skewness) and kurtosis (Ex. kurtosis), none of the ratios present 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.

¹ |Skewness| > 3 (severe asymmetry) or values of | Ex. kurtosis | > 10 (severe kurtosis) and | Ex. kurtosis | > 20 (very severe kurtosis)

4. Variable selection and model specification

The aforementioned multidisciplinary concept of entrepreneurship assumes the integration of various determinants that can explain this phenomenon. In this regard, despite the lack of data for the inclusion of institutional variables in a broader time series interval, several macroeconomic variables were tested to explain the entrepreneurial activity in Portugal between 1986 and 2012. The previous literature review on the factors that can influence entrepreneurial activity indicated the inclusion of these variables into the estimated models. The structural difference between the industrial sector and the services sector dictated the inclusion of additional explanatory variables that could distinctly influence the entrepreneurial activity of each sector (Table 2).

(Insert Table 2 here)

The stepwise regression method was chosen for defining the final structure of the estimated equations. 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, which is justified by the multidisciplinary nature of the entrepreneurship concept, the backward modality was chosen; that is, it was decided to include all the explanatory variables already mentioned 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 control variables, three models — which seek to test the impact of the macroeconomic factors on entrepreneurial activity in overall (Model 1) and sectoral (Models 2 and 3) terms — emerge for Portugal. Based on the selection of the explanatory variables by the methodology described, a set of models is specified that enables us to obtain, from the statistical point of view, robust results to derive conclusions that are as valid as possible.

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 let us determine, in absolute terms, the absolute incremental impact of the regressors on the absolute increment of the entrepreneurial activity between 1986 and 2012: overall (OER — model 1), in industry (IER — model 2), and in the services sector (SER — model 3).

Model 1:

$$\Delta OER_t = a_0 + a_1 \Delta SI_t + a_2 \Delta Ipub_t + a_3 \Delta ESsec_t + a_4 \Delta PTE_t + a_5 \Delta GDP_t + u_t \quad (1)$$

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), Ipub (public investment), ESsec (employment in the secondary sector), and PTE (part-time employment), whereas a direct relationship with the GDP is expected, as suggested by the literature review.

Model 2:

$$\Delta IER_t = b_0 + b_1 \Delta SS_t + b_2 \Delta Itot_t + b_3 \Delta Educ_t + b_4 \Delta RCE_t + b_5 \Delta LTRIR_t + b_6 \Delta GNI_t + b_7 \Delta E_t + v_t \quad (2)$$

For Model 2, considering the variable measuring entrepreneurship in industry (IER), inverse relationships are expected for SS (State spending), LTRIR (long-term interest rates), RCE (real compensation per employee), and E (employment), whereas direct relationships are expected for Itot (Total investment), Educ (enrolment rate for secondary education), and GNI (gross national income). These relationships were analysed in the previous section (literature review).

Model 3:

$$\Delta SER_t = \gamma_0 + \gamma_1 \Delta SI_t + \gamma_2 \Delta Ipub_t + \gamma_3 \Delta ESsec_t + \gamma_4 \Delta GDP_t + \gamma_5 \Delta SS_t + \gamma_6 \Delta (TR_GDP)_t + w_t \quad (3)$$

For Model 3, referred to the variable measuring entrepreneurship in the services sector (SER), inverse relationships are expected for SI (State income), Ipub (public investment), ESsec (employment in the secondary sector), SS (State spending), and TR_GDP (tax revenue as % of GDP), whereas a direct relationship with GDP is expected — these effects were explained in the literature review.

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 having the usual “white noise” properties, that is, they are all identically and independently distributed with zero mean and constant variance.

5. Empirical Evidence

Summary statistics are available in the Appendix. Given the identification of the referred models (1, 2, and 3), after evaluation, the following results were obtained as shown in Table 3.

(Insert Table 3 here)

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.

Regarding Model 1 of Table 3, allows drawing several conclusions. Given the overall entrepreneurial activity in Portugal, inverse relationships are found between entrepreneurial activity and state income, public investment, and employment, whereas 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 0.932 units in the variation of the overall entrepreneurship ratio (OER) in Portugal, everything else constant. Consequently, the initial expectation of a direct 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, given an increase of one unit in state income (from taxes and social security) or a unit increase in public investment are associated with 0.376 and 1.830 unit decrease in OER, respectively. These findings confirm the initial expectation of an inverse relationship between the collection of taxes (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 implying 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 a negative impact of employment on overall entrepreneurship — there is a negative reaction of 0.022 and 0.030 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 listed in Table 3 and indicate which determinants of the IER 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 there are direct relationships between the IER and 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 made for the 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 will justify these particular relations in connection with the hypotheses established initially.

5. Discussion of the results

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

According to our results, hypothesis 1 (H1) advocating the positive influence that GDP can have on overall/sectoral entrepreneurial activity, cannot be rejected for the overall (OER) and the services sector (SER) entrepreneurship; this is in line with Galindo and Méndez (2014) detecting that a greater entrepreneurial activity is observed in periods of economic growth justified by new business opportunities in these periods of economic expansion. Although no relationship is verified between the industry entrepreneurship (IER) and GDP, a direct (positive) relationship is observed between IER and GNI. The fact that 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 the GDP. Consequently, also in industry, there is a greater entrepreneurial activity in Portugal during periods of economic growth, consistent with the manifest perception of new business opportunities in these periods of expansion (Galindo & Méndez, 2014).

Concerning hypothesis 2 (H2), assessing that interest rates could 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, regarding the industry entrepreneurship (IER), hypothesis 2 cannot be rejected; that is, an increase in the real long-term interest rate negatively affects entrepreneurial activity in industry. This peculiarity may have something to do with the greater sensitivity of some industrial units to the interest rate (Suyuan, Han, & Khurshid, 2015), where the amount of financing this sector may be much higher than in other economic activities, and the

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 direct investment that has been realized in Portugal is accounted for in the calculation of the GDP but not in the national income.

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), assuming the positive influence that FDI could have on overall/sectoral entrepreneurial activity, we are unable to draw any conclusions. The FDI variable was not found to be statistically significant in explaining overall and sectoral entrepreneurial activity.

Hypothesis 4 (H4), which refers to the harmful effect that public investment could have on overall/sectoral entrepreneurial activity (known as the crowding-out effect), cannot be rejected at the overall (OER) and services sector (SER) cases. 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 and 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 it is also explained by public expenditure having a significant positive impact on generating higher entrepreneur 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 by the positive effect that public expenditure has on SER (the crowding-in effect). Particular features of economic policy in Portugal, may help to explain the direct relationship between public spending and entrepreneur activities in services and therefore the crowding-in effect reported. Some examples, are the constitution of public-private partnerships, the transfer of public money to the financial sector, and the subsidizing of jobs and internships for young graduates. We could emphasize here the role of the state as an element of economic dynamism (Miller & Holmes, 2012), contributing to the creation of better conditions for companies and the reduction in business costs.

Regarding hypothesis 5a (H5a), which refers to the potential positive effect of unemployment on overall/sectoral entrepreneurial activity, we are unable to draw any conclusions because the unemployment variable is not statistically relevant to explain the overall or sectoral entrepreneurial activity.

Turning to hypothesis 5b (H5b), which refers to the potential negative effect of employment on overall/sectoral entrepreneurship, there is statistical evidence in favour of this hypothesis in the OER and SER case. It is found that, the increase in employment in the secondary sector and the increase in part-time employment contribute negatively to overall entrepreneurial activity. In turn, increased employment in the secondary sector — industrial units typically absorb more wage earners — contributes to reduce entrepreneurial activity in the services sector. These results confirm the inverse relationship between employment and entrepreneurship because a person with a job is less likely to

start a new business than a person who is unemployed (Andersson & Wadensjo, 2007; Røed & Skogstrøm, 2014; von Greiff, 2009).

Considering the hypothesis 6a (H6a), which assumed that an increase in the tax burden would have an adverse effect on overall and sectoral entrepreneurial activity, we must reject the hypothesis in question with respect to the services SER sector, since the impact is found to be positive. On the other hand, we are not able to draw any conclusions in relation to OER or IER sectors since the impact of this variable is found to be 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).

Regarding hypothesis 6b (H6b), which proposed that an increase in the state's tax revenues harms overall and sectoral entrepreneurial activity, the hypothesis cannot be rejected for the overall (OER) and services (SER) sectors. In other words, the increase in the state's tax revenues, regardless of whether it comes from people or from 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 choice of starting 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 being found between fiscal revenue and the SER (H6b). There apparently seems to be a paradox in the tax variables that explain the SER sector. The tax burden, when excessive, 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, the two relationships (tax burden and tax revenue) with the SER may not be conflicting.

As for hypothesis 7 (H7), which predicts that a higher level of education fosters overall/sectoral entrepreneurial activity, in light of the results of Table 3, this hypothesis cannot be rejected for the industry IER sector. In other words, 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 that, according to Robinson and Sexton (1994), higher levels of education lead to higher success rates for new start-ups as well as higher growth rates.

Regarding hypothesis 8 (H8), which assumes that the variables that influence entrepreneurial activity in the industrial sector (IER) differ from the variables that influence entrepreneurial activity in the

services sector (SER), it is concluded that the determinants are quite different in the two sectors. For instance, in the case of the “state spending” variable, the coefficients have different signs. This finding may be indirectly related to differences in the innovation processes (Ettlie & Rosenthal, 2011) or differences in the innovation models (Devece et al., 2011) between the two sectors.

Hypothesis 9 (H9), which proposed the existence of similar determinants for the overall and services sector entrepreneurial activity in Portugal, cannot be rejected. In fact, after testing several factors, similarity was observed in the variables that affect overall and services sector entrepreneurship. This expected result can be explained by the high dependence of the Portuguese economy on the services sector. In 2015, the share of the gross value added of the services sector on total activity in Portugal was approximately 76%, and the employment share was accounted for 68% of the national total (AICEP, 2016).

6. Conclusions

Throughout this study, it was possible to identify the macroeconomic variables that most influence entrepreneurial activity in Portugal. Generally speaking, the macroeconomic variables that influence entrepreneurial activity in the services sector are similar to those that influence (in the same direction) the overall entrepreneurial activity in Portugal. This may be explained by the heavy weight of the services sector in the overall economic activity in this country. The macroeconomic variables that influence entrepreneurial activity in industry are radically different from those that influence the overall and services sector entrepreneurial activity. Regarding the implications of this study, pathways for increasing entrepreneurial activity in Portugal are decoded, thereby assessing critical information that can support the decision-making of the political agents in this area. As suggested by Acs and Mueller (2008), this document could influence a debate about how governments can facilitate and stimulate the creation of enterprises.

From our point of view of the endogenous growth theory (Lucas, 1988; Nelson & Phelps, 1966; Romer, 1986), the absence of a significant contribution of variables like R&D and human capital to entrepreneurial activity in Portugal could be a matter of concern. In fact, entrepreneurship could be one of the pillars in Portugal, assuming a competitive positioning via differentiation, which is associated with entrepreneurship through opportunity (Block, Kohn, Miller, & Ullrich, 2015). Everything depends on whether conditions are created for the entrepreneurial root to germinate (entrepreneurship through opportunity) or languish (entrepreneurship through necessity). Based on the determinants of overall/sectoral entrepreneurship detected in this study, we can ensure that the creation of favourable conditions for the germination of the entrepreneurial root involves a substantial change

in the development model has been adopted in Portugal. These conditions gravitate in the orbit of endogenous growth theory (Lucas, 1988; Nelson & Phelps, 1966; Romer, 1986), in which investments in human capital and technology play a fundamental role in changing the paradigm of economic development in Portugal.

The difficulties of conducting this study arise from the data availability, the large number of indicators that can measure entrepreneurial activity, and the restriction of the scope of the study to a macro (country) level, thereby ignoring the micro (company) level, which is referred to corporate entrepreneurship or intrapreneurship.

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Table 1. Summary Statistics on entrepreneurship over the period 1986 – 2012.

Variable	Mean	Median	Minimum	Maximum
OER	7.72500	6.80000	0.700000	19.8000
IER	7.76331	7.28421	0.658340	19.7090
SER	7.72400	6.59295	0.727756	21.9488
Variable	Std. Dev.	C.V.	Skewness	Ex. kurtosis
OER	5.86807	0.759620	0.471896	-0.995773
IER	5.88026	0.757442	0.338173	-1.08166
SER	6.01446	0.778671	0.644829	-0.606168
Variable	5% Perc.	95% Perc.	IQ range	Missing obs.
OER	0.830000	18.6300	10.6250	0
IER	0.678267	18.7859	10.8126	0
SER	0.857403	19.5239	10.4363	0

Source: own elaboration

Table 2. Explanatory control variables.

Variable and acronym	Unit	Source
Employment (E)	Thousands	AMECO
Unemployment (U)	Thousands	
Short-term real interest rate (STRIR)	Rate (%)	
Long-term real interest rate (LTRIR)	Rate (%)	
Trade balance (TB)	Mrd euro	
Consumption (C)	Mrd euro	
GDP at constant prices of 2005 (GDP)	Mrd euro	
Gross national income (GNI)	Mrd euro	
Exports (Exp)	Mrd euro	
Imports (Imp)	Mrd euro	
Exports/imports ratio (RE/I)	Rate (%)	
State spending in real terms (SS)	Index (National currency: 2005 = 100)	
State income (Taxes + Social Security) (SI)	Mrd euro	
Public investment at current prices (Ipub)	Mrd euro	
Private investment at current prices (Ipriv)	Mrd euro	
Total investment at constant prices (Itot)	Mrd euro	
Real compensation per employee (RCE)	Index (National currency: 2005 = 100)	
Total net savings (TNS)	Mrd euro	
State net savings (SNS)	Mrd euro	
Private net savings (PNS)	Mrd euro	
Inflation rate (Inf)	Rate (%)	INE, PORDATA
Employment in the secondary sector (ESsec)	Thousands	
Employment in the tertiary sector (ETsec)	Thousands	
Part-time employment (PTE)	Thousands	OECD
Investment in R&D in the private sector (IR&D)	Millions euro	
No. of people affected by R&D (PR&D)	Persons dedicated to full time R&D activities	
Education (Enrolment rate for secondary education) (Educ)	Rate (%) of population	DGEEC/MEC; INE, PORDATA
Foreign direct investment (FDI) – Inward flow	Millions US Dollars at current prices	UNCTAD
Tax revenue as a % of GDP (TR_GDP)	Rate (%)	INE–BP, PORDATA

Source: AMECO³, INE⁴, PORDATA⁵, DGEEC/MEC⁶, OECD⁷, UNCTAD⁸, BP⁹.

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)

Table 3. Entrepreneurship in Portugal and its determinants, 1986 – 2012

Variables	(OER) Overall entrepreneurship ratio (Model 1)	(IER) Industry entrepreneurship ratio (Model 2)	(SER) Services entrepreneurship ratio (Model 3)
Constant	-1.63679*** (0.0006)	2.60159* (0.0531)	-2.56053*** (1.07e-05)
State income (Taxes and Social Security) (SI)	-0.376194** (0.0278)	-----	-0.599945*** (0.0033)
Public investment (IPub)	-1.82959*** (0.0001)	-----	-2.62366*** (3.44e-05)
Employment in the secondary sector (ESsec)	-0.0215489*** (5.37e-05)	-----	-0.0286053*** (6.36e-07)
Part-time employment (PTE)	-0.0298740*** (0.0052)	-----	-----
Real GDP (GDP)	0.932052*** (6.14e-07)	-----	0.818483*** (9.88e-06)
State spending in real terms (SS)	-----	-1.30379*** (0.0031)	0.457733*** (0.0003)
Total investment (Itot)	-----	-3.04762*** (0.0045)	-----
Education (Educ)	-----	0.802884*** (0.0096)	-----
Real compensation per employee (RCE)	-----	2.27976*** (0.0013)	-----
Real interest rate (LTRIR)	-----	-0.668158** (0.0410)	-----
Gross national income (GNI)	-----	1.47278*** (0.0028)	-----
Total Employment (E)	-----	0.0515036*** (0.0066)	-----
Tax revenue as a % of GDP (TR_GDP)	-----	-----	1.14505*** (0.0049)
R ²	0.76	0.75	0.81
Heteroscedasticity (White's test)	P(Chi-square(20) = 25.304718) (0.190021)	P(Chi-square(14) = 13.0346) (0.523801)	P(Chi-square(12) = 9.289503) (0.678024)
Autocorrelation of the errors (LMF)	F(1,20) = 2.675154 (0.118)	F(1,18) > 0.300968 (0.59)	F(1,19) = 0.465916 (0.503)

Specification (RESET Test)	F(2,19) = 0.924215 (0.414)	F(2,17) = 0.369708 (0.696)	F(2,18) = 0.501938 (0.614)
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Source: elaborated by the authors.

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.

Appendix - Summary Statistics, using the period 1986 - 2012

Variable	Mean	Median	Minimum	Maximum
OER	7.72500	6.80000	0.700000	19.8000
IER	7.76331	7.28421	0.658340	19.7090
SER	7.72400	6.59295	0.727756	21.9488
Employment (total) — E	4770.19	4718.47	4298.31	5151.24
Real interest rate (LTRIR)	3.31647	3.25281	-2.13291	10.8785
GDP at constant prices of 2005 (GDP)	127.410	133.540	79.8809	160.205
Gross national income (GNI)	124.818	132.620	75.2034	155.120
State spending in real terms (SS)	76.5638	77.1539	38.4235	113.666
State income (Taxes and Social Security) (SI)	34.3665	34.4189	3.01406	62.6046
Public investment (IPub)	3.56070	3.96574	0.561357	6.49652
Total investment (Itot)	28.2419	27.8792	14.9375	39.5437
Education (Educ)	47.3000	58.3000	12.2000	73.6000
Real compensation per employee (AMECO definition) — RCE	81.9836	89.6526	49.6466	100.000
Employment in the secondary sector (ESsec)	1501.26	1510.40	1049.70	1741.70
Part-time employment (PTE)	464.435	536.600	243.800	665.000
Tax revenue as a % of GDP (tax burden, according to the OECD) — TR_GDP	18.0375	19.0500	13.4000	21.2000
Variable	Std. Dev.	C.V.	Skewness	Ex. kurtosis
OER	5.86807	0.759620	0.471896	-0.995773
IER	5.88026	0.757442	0.338173	-1.08166
SER	6.01446	0.778671	0.644829	-0.606168
Employment (total) — E	272.871	0.0572034	0.0776658	-1.40527
Real interest rate (LTRIR)	2.70738	0.816344	0.961730	1.44398
GDP at constant prices of 2005 (GDP)	28.5487	0.224070	-0.458415	-1.25667
Gross national income (GNI)	28.0852	0.225010	-0.596516	-1.08937
State spending in real terms (SS)	23.5147	0.307126	-0.243370	-1.24467
State income (Taxes and Social Security) (SI)	20.8363	0.606295	-0.0871261	-1.45293
Public investment (IPub)	1.90262	0.534339	-0.251106	-1.38135
Total investment (Itot)	7.68701	0.272185	-0.214286	-1.14943
Education (Educ)	20.3116	0.429420	-0.529334	-1.19481
Real compensation per employee (AMECO definition) — RCE	16.8284	0.205265	-0.678755	-1.10003
Employment in the secondary sector (ESsec)	159.657	0.106349	-0.784844	0.860797
Part-time employment (PTE)	145.118	0.312461	-0.219217	-1.60844
Tax revenue as a % of GDP (tax burden, according to the OECD) — TR_GDP	2.29807	0.127405	-0.984829	-0.316037
Variable	5% Perc.	95% Perc.	IQ range	Missing obs.
OER	0.830000	18.6300	10.6250	0
IER	0.678267	18.7859	10.8126	0
SER	0.857403	19.5239	10.4363	0
Employment (total) — E	4362.38	5148.57	549.475	0
Real interest rate (LTRIR)	-0.697666	10.4213	3.28784	3
GDP at constant prices of 2005 (GDP)	79.9226	160.196	49.4177	0
Gross national income (GNI)	75.5608	154.694	47.0254	0
State spending in real terms (SS)	38.7877	109.829	45.8482	0

State income (Taxes and Social Security) (SI)	3.60187	62.1438	42.4084	0
Public investment (IPub)	0.601664	6.11576	3.56300	0
Total investment (Itot)	15.0234	39.3839	12.8381	0
Education (Educ)	13.3700	72.8850	34.9000	0
Real compensation per employee (AMECO definition) — RCE	51.1540	99.8184	30.8673	0
Employment in the secondary sector (ESsec)	1110.67	1737.15	195.325	0
Part-time employment (PTE)	250.220	651.980	256.200	1
Tax revenue as a % of GDP (tax burden, according to the OECD) — TR_GDP	13.4650	20.6150	2.77500	0



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