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OPEN

DOI: 10.2478/ijme-2014-0043

International Journal of Management and Economics (Zeszyty Naukowe KGŚ)
No. 42, April–June 2014, pp. 60–80; http://www.sgh.waw.pl/ijme/

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An Empirical Analysis of Economic and Socio-Demographic Determinants of Entrepreneurship across German Regions

Abstract

Entrepreneurship is fundamental for a country's economic development through its positive effect on innovation, productivity growth, and job creation. In entrepreneurial research, one of the most important problems is to define the factors that actually determine entrepreneurial action. This study analyzes that question in the case of Germany by taking an aggregated approach that focuses on socio-demographic and economic determinants of regional entrepreneurship. Based on a literature review of German and international regional-level research, six hypotheses are developed and empirically tested using the most recent available data on 385 German regions as units of analysis. The results are surprising. In the case of household income, unemployment, education and marital status the relationship is significant but contrary to earlier research. Only regional age structure seems to be a stable predictor of regional entrepreneurship. The results indicate that in recent years there was a major shift in the determinants and characteristics of entrepreneurship in Germany.

Keywords: entrepreneurship, self-employment, determinants of entrepreneurship, regions, Germany
JEL: J23, L26, M13, O18, R11

Introduction

Entrepreneurship fundamentally impacts a country's economic development and competitiveness through its positive effect on innovation, productivity growth and job creation[1]. It comes as no surprise that entrepreneurship research is becoming an increasingly important stream in economic literature. Thereby, one of the most important problems in entrepreneurship research is to identify the factors that actually determine entrepreneurial action. Works aiming at answering this question range from studies on psychological factors influencing individual decisions to become an entrepreneur [e.g. Begley, Boyd, 1987; Forbes, 1999; Keh et al., 2002; Krueger, 2000; Shaver, Scott, 1991; Simon et al., 2002] to aggregated macro studies on the cultural and institutional determinants of entrepreneurial activity across countries [e.g., Aidis et al., 2012; Aldrich, 1990; Baumol, 1990; Djankov et al., 2002; Douhan, Henrekson, 2010; Estrin, Mickiewicz, 2011; Freytag, Thurik 2007; Johnson et al., 2002; Tonoyan et al., 2010].

A similar division can be found when considering research on determinants of entrepreneurship that focus on single countries. Thus, in the case of Germany, which is the focus of this study, research on the drivers of entrepreneurship can be divided into two streams as well. The first stream is individual-level literature focusing on individual characteristics such as age, education, marital status, migration background, and their impact on the decision to become self-employed [e.g. Fritsch et al., 2012; Fritsch et al., 2013]. However, due to its individual-level character this research perspective is relatively narrow as it neglects environmental effects on the decision to engage in entrepreneurship.

Regional-level literature, which is the second literature stream, overcomes this drawback by taking into account aggregated individual-level variables as well as environmental aspects, such as regional economic development, unemployment levels, tax policy etc. The usage of socio-demographic and environmental variables in one empirical model allows us to compare the relevance of both categories and to derive relevant implications for the shapers of regional economic and entrepreneurship policy.

Existing regional-level literature, is, however, largely based on obsolete data that takes into account only Western German regions [Audretsch, Fritsch 1994; Audretsch, Fritsch, 2002; Brixy, Grotz, 2007; Fritsch, Falck, 2007] or uses data from the beginning of the new millennium [Audretsch et al., 2010; Bergmann, Sternberg, 2007; Rocha, Sternberg, 2005].

This paper addresses that drawback by using 2011 German Census data and the most recent data from the statistical offices of the German federal states (Regionaldatenbanken) for its empirical analysis. This data refresh is particularly important as in the recent years Germany's economy underwent a significant transformation following the political reforms of the Agenda 2010, the turbulences of the economic crisis, and also general social and demographic changes. It is highly likely that these developments had a major impact on

the characteristics of entrepreneurial activity in Germany, which again warrants a fresh examination.

This paper takes on that research gap. It is structured as follows. After the introduction in section 1, the theoretical background is provided, and hypotheses developed, in section 2. Section 3 describes the data used and their operationalization. The results of the empirical analysis are presented in section 4. Section 5 discusses the results, policy implications, and limitations of the research.

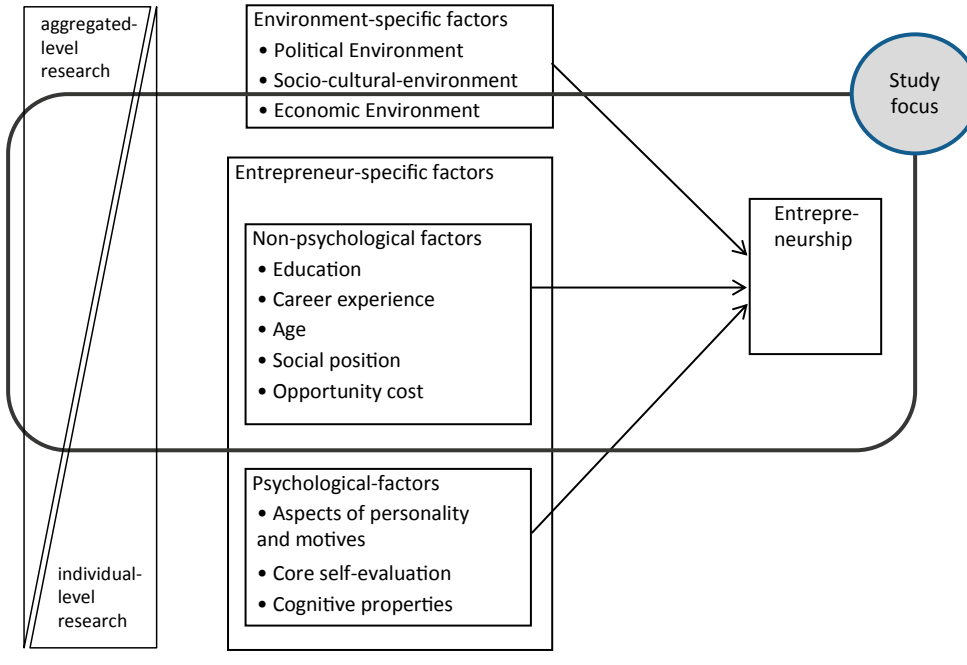
Determinants of Entrepreneurship

Factors influencing individual decisions to exploit business opportunities and engage in entrepreneurship are multifold. The magnitude of entrepreneurship determinants and the different levels in which they unfold their influence forces researchers to take on different observation levels and apply various methodological lenses to analyze the reasons why entrepreneurship occurs.

A comprehensive framework for classifying and identifying the most important determinants of entrepreneurship is provided by Shane [2003]. Accordingly, it is possible to group the different factors into two categories: external environment-specific factors and entrepreneur-specific factors, whereas the latter are again divided into psychological and non-psychological factors. The first category consists of the economic environment (including the tax system, economic growth, unemployment etc.), the political environment (including rule of law, regulations, and property rights) and the socio-cultural environment (social habits, values and norms etc.). These characteristics are typically analyzed within aggregated studies on a cross-national or cross-regional level. This study focuses on the economic aspects only because it is assumed that political and cultural aspects do not vary significantly across regions within a country like Germany, in which regions are relatively homogenous regarding the institutional environment (laws, regulations) and cultural environment (language, habits, values or religion).

The second category of factors includes both psychological aspects of entrepreneurship (including the motivation, personality, cognitive abilities, and risk tolerance of the entrepreneur) and non-psychological – or socio-demographic factors – which include the entrepreneur's educational background, working experience, age, social position, and the opportunity costs of being self-employed [Shane, 2003]. Psychological determinants are typically investigated in individual-level research, while socio-demographic determinants are investigated in individual-level but also aggregated-level research. This study focuses on the economic and socio-demographic determinants of entrepreneurship, taking a regional-level perspective. Illustration 1 is an overview of these entrepreneurship determinants and defines the focus of this study.

FIGURE 1. **Determinants of entrepreneurship**



S o u r c e : Own illustration based on Shane [2003].

Determinants of Entrepreneurship at a Regional Level

Economic Determinants of Entrepreneurship

Opportunity Costs

The theory of income choice postulates that the decision to become an entrepreneur or an employee is dependent on the utility associated with the returns resulting from the two types of activity [Grilo, Irigoyen, 2006]. Thus, a potential entrepreneur implicitly compares the utility of being self-employed with the opportunity costs of engaging in other activities [Johnson, 1986]. As long as the economic return from entrepreneurship will be less than the reward of the best alternative (e.g., paid employment) a rationally acting individual will not engage in entrepreneurship [Hamilton, Harper, 1994]. In short: entrepreneurs must believe they will obtain more than they are giving up when engaging in entrepreneurship [Venkataraman, 1997; Shane, 2003].

Two factors – income and unemployment – are particularly important regarding the opportunity costs of entrepreneurs [Shane, 2003]. Accordingly, individuals who have highly paid employment alternatives are less likely to engage in self-employment [Evans, Leighton, 1989; Johansson, 2000; Shane, 2003]. This link has found strong support in previous empirical studies conducted in Canada [Amit et al., 1995]; Finland [Johansson, 2000], United Kingdom [Taylor, 1996] and the United States [Evans, Leighton, 1989]. It is therefore hypothesized:

H1: *Entrepreneurship will occur more often in regional districts with a relatively low household income than in regional districts with a relatively high household income.*

At the same time, the theory of income choice implies that individuals who are unemployed face lower opportunity costs of entrepreneurship due to low income levels and, therefore, are more likely to engage in entrepreneurship. The positive impact of unemployment on entrepreneurship is therefore often referred to as the "*unemployment push*" effect [Thurik et al., 2008, p. 674].

Using data for the years 1986–1989, Audretsch and Fritsch [1994] show that in the case of Western Germany unemployment is at least partially positively related to entrepreneurial activity. Similarly, Fritsch and Falck [2007], who base their analysis on data for Western Germany for the period 1983–1997, find that short-term unemployment has a positive effect on entrepreneurship. It is therefore assumed that this relationship remains valid in the case of reunified Germany. It is hypothesized:

H2: *Entrepreneurship will occur more often in regional districts with a relatively high unemployment rate than in regional districts with a relatively low unemployment rate.*

Taxes

The relationship between taxes and entrepreneurship is expected to be a negative one. This is because taxes have a direct effect on the profitability of a business opportunity and may therefore negatively influence the decision to found a company. Fölster [2006] provides five further theoretical arguments why taxes are negatively related to entrepreneurship. First, relatively high taxes reduce household savings, which might otherwise be used as start-up capital. Second, high taxes imply higher unemployment benefits, which increases the opportunity costs of entrepreneurship. Third, higher taxes often bring about more complicated tax systems, which then lead to higher costs of entrepreneurship as self-employment requires entrepreneurs to navigate this more complex tax structure. Fourth, high taxes lead to a crowding-out effect, so that services are increasingly provided by tax-funded government agencies rather than by private firms. Fifth, relatively high taxes lead to a situation in which an increasing number of potential voters work for the state apparatus, with the natural consequence that political decisions may tend to favor employees of governmental agencies or state-owned enterprises and penalize private businesses, thus making entrepreneurship less attractive.

Empirical research on the impact of the tax burden on entrepreneurship supports the expected negative relationship [Blau, 1987; Carrol et al., 1998a/1998b; Robson, Wren, 1999]. Similar results in the case of Germany are reported by Fossen and Steiner [2009] who find a negative link between income taxes and the probability of being self-employed. Consequently, it is expected that the negative relationship between taxes and entrepreneurship is valid on a regional level as well. It is hypothesized:

H3: *Entrepreneurship will occur more often in regional districts with a relatively low tax burden than in regional districts with a relatively high tax burden.*

Socio-Demographic Determinants of Entrepreneurship

Education

Higher education enhances the individual's general analytic ability and understanding of the entrepreneurial process [Casson, 1995]. Business education also provides market information and practical information on how to manage a company. Thus, higher education allows potential entrepreneurs to more accurately assess business opportunities and increase potential gains from self-employment, which again makes it more likely that an individual will engage in entrepreneurship [Shane, 2003]. This theoretical expectation is confirmed in several empirical studies on the country-level, e.g. in Finland [Ritsilä, Tervo, 2002], France [Guesnier, 1994], United Kingdom [Brown et al., 2006] and the United States [Bull, Winter, 1991; Grant, 1996]. Similar results were found in Germany. Examining regional entrepreneurship monitor data from 2001–2002, Tamasy [2006] found similar positive effects in the case of three major German agglomerations. Audretsch and Fritsch [1994] and Brixy and Grotz [2007] analyzed entrepreneurship in Western German regions in 1985 and the period 1984–1997, respectively, and found the qualification level of the work force to be an important determinant of entrepreneurship. Finally, Bergmann and Sternberg [2007] found that higher education is positively related to nascent entrepreneurship. It is therefore expected that the positive relationship between education and entrepreneurship is also valid when considering all German regions. It is hypothesized:

H4: *Entrepreneurship will occur more often in regional districts with a relatively high share of people with higher and/or a vocational education than in regions with a relatively low share of people with higher and/or a vocational education.*

Age

From a theoretical point of view the relationship between age and self-employment is characterized by two contradictory aspects. On the one hand, age might be expected to positively correlate with self-employment, as it incorporates the positive effect of professional experience that increases with age. On the other hand, age also involves the negative effect of higher opportunity costs (e.g., income), which increase with age and experience as well [Shane, 2003]. Consequently, it is appropriate to expect a curvilinear

rather than a linear relationship between age and self-employment. In short: it is more likely that relatively young and relatively old individuals will engage in entrepreneurship less often, and that there is an optimal time-frame for becoming self-employed. The literature mostly agrees that this optimal time is in middle age, when individuals tend to experience a period of freedom and flexibility with regard to the choice of occupation [Ritsilä, Tervo, 2002].

This theoretical assumption is supported by empirical research. Using US census data Borjas and Bronars [1989] found a negative U-shaped relationship between self--employment and age. Reynolds [1994] found that in 382 US labor markets the percentage of population in the area between 25 and 44 increased firm formation rates. A similar result is found for Finland, where the percentage of population aged 25 to 40 is found to be positively related to entrepreneurial action [Ritsilä, Tervo, 2002]. The inverted U-shape relationship between age and entrepreneurial action has been found in Germany, as well [Bergmann and Sternberg, 2007]. In line with above findings it is hypothesized:

H5: *Entrepreneurship will occur more often in regional districts with a relatively high share of middle-aged population than in regional districts with a relatively low share of middle-aged population.*

Social Position

Social position refers to a person's link to other members of the social community in which they work and live [Shane, 2003]. One of the most relevant aspects of an individual's social position is his/her marital status. Not surprisingly, it is expected that marital status also impacts the decision to become self-employed. More broadly, it is theoretically expected that strong social (but also formal) ties, like marriage, and self-employment are positively linked. One economic argument for this positive relationship is that marriage helps entrepreneurs minimize self-employment costs, as family members can serve as a source of cheap labor [Bates, 1995]. Furthermore, for married individuals the negative financial consequences of self-employment failure may be cushioned by a working spouse [Shane, 2003]. Indeed, Fossen and Steiner [2009] find a positive link between spousal income level and the probability of self-employment. Ritsilä and Tervo [2002, p. 37] also suggest that individuals with families face a psychological "*extra push*" to gain their living through entrepreneurship. This hypothesized relationship is also found in several empirical studies examining the impact of being married on the likelihood on self-employment [Bates, 1995; Bruce, 1999; Johansson, 2000; Robinson & Sexton, 1994]. Based on above discussion it is hypothesized:

H6: *Entrepreneurship will occur more often in regional districts with a relatively high share of persons with close social ties than in regional districts with a relatively low share of persons with close social ties.*

Data and Operationalization

This research is based on regional district data on socio-demographic factors provided by the German Census 2011 and on economic data provided by the regional databases of the federal statistical offices (Regionaldatenbank Deutschland).

Dependent Variable

Entrepreneurship is operationalized by using business registration rates (BUSREG2012) in the regional districts in 2012.This measure mirrors the dynamics of entrepreneurial activity in a certain region. Data are taken from the regional database of the federal statistical offices (Regionaldatenbank Deutschland). This database distinguishes four types of business registrations in a given region. (i) New business creation by private persons and small and medium sized companies (SMEs); (ii) new business creation by large companies; (iii) influx of businesses into a certain region; and (iv) acquisitions of existing businesses. Given our focus on entrepreneurial action, this work focuses on the first category only, and uses new business creation by private persons and SMEs as an indicator of entrepreneurship. To reach the final indicator the figure of 2012 is taken and divided through the population of the region.

Independent Variables

Opportunity costs are operationalized by taking into account the average regional household income in 2009 (INCOME 2009) as well as the regional unemployment rate at the end of January 2011 (UNEMPL 2011). In accordance with hypotheses 1 and 2, a negative relationship between average household income and entrepreneurship, and a positive relationship between unemployment and entrepreneurship, is expected.

Tax burden is operationalized by taking into account the multiplier of the regional business tax (Gewerbesteuerhebesatz) in 2011 (TAX 2011), which differs significantly across German regions. According to hypothesis 3 a negative impact of taxes on entrepreneurship is expected.

Education: The level of education in a certain region is proxied by taking into account the proportion of population who either graduated from an apprenticeship (Berufsausbildung) and/or hold a degree from a university (EDUC). A positive link to entrepreneurship is expected in accordance with hypothesis 4.

Age: As a proxy for age, the proportion of total population aged 30–64 in a particular region is used (AGE). Taking into account the curvilinear effect of age on entrepreneurship, hypothesis 5 predicts a positive link between a high share of people aged 30–64 and the entrepreneurial activity in a certain region.

Social position: One of the most relevant aspects of an individual's social position is his/her marital status. The variable social position is therefore proxied by the means of

the proportion of married people/people living in a civil partnership in a certain regional district (SOCPOSIT). According to hypothesis 6, a positive influence of above measure on entrepreneurship is expected.

Four *control variables* are also added to the models. The total population measure controls for size effects (POP). GDP/capita controls for differences in economic development of the regional districts in Germany (GDPCAP2010). The industrial structure of a region is in the proportion of people employed in the services (SECTSERV) and agricultural (SECTAGRIC) sectors. It is expected that the size of both sectors is positively related to entrepreneurship as SMEs are particularly active in each of those sectors. Table 1 provides an overview of the variables used in the empirical analysis.

TABLE 1. Overview of variables

Variable	Abbrev.	Operationalization	Variable type	Source
Entrepreneurship	BUSREG 2012	New business creations by private persons and SMEs in a region in 2012 divided by the population of a region.	dependent	Regionaldatenbank Deutschland
Household income	INCOME 2009	Disposable household income in EUR in 2009.	independent	Regionaldatenbank Deutschland
Unemployment	UNEMPL 2011	Unemployment rate in % at the end of January 2011.	independent	Regionaldatenbank Deutschland
Regional taxes	TAX 2011	Multiplier of the regional business tax (Gewerbesteuerhebesatz) in 2011.	independent	Regionaldatenbank Deutschland
Education level	EDUC	Proportion (%) of population who either graduated from an apprenticeship (Berufsausbildung) and/or hold a degree from a university (EDUC) in 2011.	independent	German Zensus 2011
Age structure	AGE	Proportion (%) of total population aged 30–64 in a region in 2011.	independent	German Zensus 2011
Social structure	SOCPOSIT	Proportion (%) of married people or people living in a civil partnership in a region in 2011.	independent	German Zensus 2011
Size of region	Log POP	Population of a region in 2011.	control	Regionaldatenbank Deutschland
Regional economic development	Log GDPCAP 2010	Gross domestic product per capita in a region in 2010.	control	Regionaldatenbank Deutschland

Variable	Abbrev.	Operationalization	Variable type	Source
Role of agriculture	SECTAGRIC	Proportion of persons employed in the agricultural sector in 2011.	control	German Zensus 2011
Role of service sector	SECTSERV	Proportion of persons employed in the service sector in 2011.	control	German Zensus 2011

Source: own elaboration.

Results

Descriptive Statistics

Table 2 reports the descriptive statistics of the analyzed sample. The sample sizes vary as data were not available for all regional districts across different time periods[2].

The lowest value of the per capita registration rate of new businesses in 2012 is found in the Wartburg Kreis in the federal state of Thuringia (0.003), while the highest rate is in the city of Offenbach am Main (0.027).

The district with the lowest economic wealth is, surprisingly, the Western district Südwestpfalz (Rhineland-Palatinate) with EUR 13,395 per capita in 2010, and the richest district according to GDP/capita is the city of Wolfsburg (EUR 91,332 per capita), in which the multinational car producer "Volkswagen" is headquartered. The smallest district in the sample, according to population, is Zweibrücken in the federal state of Saarland with a population of approx. 34,000, while the largest entity is Berlin with a population of 3.45 m. The most rural area with a share of nearly 10% of people employed in the agricultural sector is the Demmin district in the federal state of Brandenburg. Several city regions do not have any significant agricultural economy (0%). Dingolfing (Bavaria) has the lowest share of people employed in the service sector (45.2%). The former capital, Bonn, is the city with the largest share of persons employed in the service sector (87.3%).

When it comes to economic measures, the lowest household income figure is found in the city of Weimar (EUR 13,895), and the highest in the city of Heilbronn (EUR 31,020). The city with the lowest unemployment rate in 2011 is Eichstätt in Bavaria (2.1%). The highest unemployment rate is found again in the rural Demmin district (20.1%).The most attractive region – as to tax burden – is Dahme-Spreewald in the federal state of Brandenburg with a multiplier of the regional business tax (Gewerbesteuerhebesatz) of 246. The least attractive regions, with a 490 multiplier, are the cities of Bottrop, Duisburg, Hagen, Munich and Oberhausen.

Finally, when considering the socio-demographic characteristics of the investigated regions, the highest share of highly educated people is found in the district Vogtlandkreis

in the federal state of Saxony and Weimarer Land in the federal state of Thuringia, in which 87.3% of the population have either an apprenticeship (Berufsausbildung) and/or a degree from a university. The city of Pirmasens (Rhineland-Palatinate), at 59.8%, has the lowest share of highly educated people.

The highest share of people aged 30–64 is found in the Bad Doberan district (54%) in the federal state of Mecklenburg-Vorpommern, and live in the cities of Würzburg, Greifswald and Jena (43%).

The city of Heidelberg has the lowest rate of married households (34.1%), while the Rhein-Pfalz-Kreis (Rhineland-Palatinate) has the highest (52%). Table 2 gives an overview of the variables and their descriptive statistics.

TABLE 2. Descriptive statistics

	Min	Max	Mean	Std. Dev.
BUSREG2012	0.00352	26.78	6.9771	2.07042
GDPCAP2010	13395	91332	28310.22	11461.878
POP	34.0	3447.0	199.622	230.6368
SECTOR_AGRIC	0	9.8	2.99	1.719
SECTOR_SERVICE	45.2	87.3	65.990	7.9901
INCOME2009	13895	31020	18593.77	2392.041
UNEMPL2011	2.10	20.10	7.8099	3.65352
TAX2011	246.00	490.00	371.9952	46.51250
EDUC	59.80	87.30	73.8772	5.75394
AGE	43	54	.4879	.01705
SOCPOSIT	34.13	52.01	46.40	3.48

Source: own elaboration

Regression Results

Multiple regression analysis is applied to investigate hypotheses 1–6. Multicollinearity[3] is not problematic as all variance inflation factor tests (VIF) range under 5 [Snee, 1977]. Table 3 reports the results of the regression models testing hypothesis 1–6. Two models are provided. Model 1 presents the base model with only the control variables included. Model 2 includes the control variables and independent variables, thus testing hypotheses 1–6. The analyzed sample encompasses 385 regions in model 1 and model 2.

TABLE 3. Economic and socio-demographic determinants of entrepreneurship – Results of OLS regression

Dependent variable	Model 1		Model 2	
	business registration rates in 2012 (BUSREG2012)			
	Value	Sig.	Value	Sig.
R sq.	0.358		0.462	
Adj. R sq.	0.351		0.448	
F-Stat	55.589***		33.052***	
Constant	t=-7.460***	0.000	t=-1.804^	0.072
	Std. Beta	Signif	Std. Beta	Signif
Controls				
Log GDPCAP2010	0.361***	0.000	0.169**	0.005
Log POP	0.081^	0.057	0.041	0.342
SECTAGRIC	0.002	0.969	–0.024	0.649
SECTSERV	0.359***	0.000	0.382***	0.000
Economic determinants				
INCOME2009			0.130*	0.020
UNEMPL2011			–0.130*	0.027
TAX2011			–0.069	0.233
Socio-demographic determinants				
EDUC			–0.238***	0.000
AGE			0.201***	0.000
SOCPOSIT			–0.229**	0.003

^=significant at 10%; *=significant at 5%; **=significant at 1%; ***=significant at 0.1%

Source: own elaboration.

Model 1, including the control variables only, is reasonably defined and highly significant – explaining over 35% of the variations in entrepreneurial activity.

Model 2 introduces the independent variables and accounts for 45% of the variance, thus improving model fit by 10%.

It appears that the opportunity cost dimensions INCOME 2009 and UNEMPL 2011 indeed have a significant effect on entrepreneurship. However, the algebraic signs are in contrast to hypothesis 1 (positive instead of negative) and hypothesis 2 (negative instead of positive). Thus, a high income level is positively related with regional entrepreneurial activity, while unemployment actually leads to less entrepreneurship.

Hypothesis 3 cannot be confirmed as TAX2011 is not significantly related to entrepreneurship and, surprisingly, tax burden does not appear to be an important predictor of entrepreneurial action on a regional level.

When considering the socio-demographic determinants of entrepreneurship, it appears that education (EDUC) is actually negatively related to entrepreneurship, which is in contrast to hypothesis 4. Accordingly, regions with a higher share of educated people experience lower levels of business registrations. This link is quite strong as the negative predictor is highly significant at the 0.1 level.

Hypothesis 5 is confirmed, as regional age structure (AGE: share of 30–64 years old persons) is positively related to regional entrepreneurship. The predictor is significant at the 0.1 level indicating a strong relationship as well.

Finally, the variable SOCPOSIT, defined as a high share of people living in formal relationships, is actually negatively related to entrepreneurship. This implies that regions with informal relationships or a high share of single households experience higher levels of entrepreneurship. Table 4 gives an overview of the hypothesized links and the relationships found.

TABLE 4. Overview of hypotheses

Hypotheses	Expected link	Link found
H1: Entrepreneurship will occur more often in regional districts with a relatively low household income than in regional districts with a relatively high household income.	–	+
H2: Entrepreneurship will occur more often in regional districts with a relatively high unemployment rate than in regional districts with a relatively low unemployment rate.	+	–
H3: Entrepreneurship will occur more often in regional districts with a relatively low tax burden than in regional districts with a relatively high tax burden.	–	No link
H4: Entrepreneurship will occur more often in regional districts with a relatively high share of people with higher and/or vocational education than in regions with a relatively low share of people with higher and/or vocational education.	+	–
H5: Entrepreneurship will occur more often in regional districts with a relatively high share of middle-aged population than in regional districts with a relatively low share of middle-aged population.	+	+
H6: Entrepreneurship will occur more often in regional districts with a relatively high share of persons with close social ties than in regional districts with a relatively low share of persons with close social ties.	+	–

Source: own elaboration.

Conclusion and Policy Implications

The major aim of this paper was to test whether the economic and socio-demographic determinants of entrepreneurship, found to be significant in earlier studies are still valid in the German case. What can be said, in general, is that economic and socio-demographic factors do indeed matter for entrepreneurship. However, when considering German regions they matter in different ways and often differently than expected. The entrepreneurship determinants are discussed, in detail, below.

Opportunity Costs

Using income choice theory, it was hypothesized that income is negatively related to entrepreneurship. At the same time unemployment is expected to be positively linked to entrepreneurial action. The gap between expectation and result is surprising.

First of all, as the analysis shows, regions with a relatively high income level experience higher entrepreneurship rates. It seems that the opportunity cost effect is overlapped by a stronger, positive effect of wealth on entrepreneurship. Indeed, it is likely that in wealthy regions some people do not decide on entrepreneurship due to high opportunity costs, but it seems that people are rather attracted by the regional wealth to become entrepreneurs. Thus, a higher regional purchasing power increases the amount of profitable entrepreneurial opportunities as it translates into a higher demand for products and services [Audretsch, 1995]. At the same time, entrepreneurs can find more favorable financing conditions in wealthy regions as relatively high income level leads to better availability of capital needed for set-up investments [Hurst, Lusardi, 2004].

Secondly, when considering unemployment as the measure of opportunity costs, it appears that regions with high unemployment have lower business registration rates. This result is particularly interesting when compared to earlier results for Germany by Audretsch and Fritsch [1994] and Fritsch and Falck [2007], who actually found a positive relationship between unemployment and entrepreneurship. It seems that the structure of unemployment has significantly changed within the last years as Germany's prospering economy, experiencing the lowest unemployment rates in 20 years, has made it easier for motivated individuals to find work than in the years of relatively high unemployment (e.g. 1994–2007). With decreasing unemployment, the share of unemployed individuals who are simply not interested in any kind of economic activity, is growing. This tendency is furthermore strengthened by the largely developed German social welfare system which additionally increases opportunity costs of employment and self-employment. The current unemployment rate may therefore be mirroring voluntary unemployment.

It might be assumed that unemployment is a negative predictor not only of entrepreneurship but most probably also of economic activity in general (including employment and self-employment).

Summing up, despite low opportunity costs poorer regions seem to have a lower entrepreneurial potential than wealthy regions. This should be taken into account by policy makers. It is likely that the actual unemployment rate currently mirrors the share of individuals who are not interested in any economic activity and lack the motivation and ambition to found and successfully run a company. This situation renders the effectiveness of entrepreneurship programs with the stated goal of bringing unemployed persons back to the labor market is highly questionable, suggesting that – in poorer German regions suffering from high unemployment – different policy measures may well be needed to further that policy goal.

Taxes

The hypothesized negative link between taxes and entrepreneurial activity is intuitive, but could not be confirmed in this article. Our data for the German regions do not show that taxes are an important predictor of entrepreneurship.

One explanation for this surprising result is that the focus of above empirical study is on the very early stages of entrepreneurship (operationalized by business registrations) in which profits either do not exist or are at a very low level. Due to the fact that the German corporate income tax is based on profits, this factor is least important when profits are low. However, it seems likely that as revenues grow so, too will profits, at which point taxes may become increasingly important for the economic activity of companies.

The existence of two contradictory effects of taxes on entrepreneurship may also partially explain this unexpected result. More specifically, taxes can positively influence regional entrepreneurship, provided the regional government invests the money generated by those taxes in policy measures that support SMEs (e.g., entrepreneurship trainings, business planning contests, low-interest rate loans, infrastructural investments etc.). Increasing taxes, however, also lower profits which makes entrepreneurship less attractive. Future research on this delicate balance may contribute to formulating effective tax policies that facilitate entrepreneurship.

Education

Another surprising result concerns the link between the regional education-level and entrepreneurial activity. Contrary to hypothesis 4, this relationship is negative. This result differs from prior regional-level research [Audretsch, Fritsch, 1994; Bergmann, Sternberg, 2007; Brixy, Grotz, 2007], indicating that the characteristics of entrepreneurship in Germany are changing. Simply stated, in Germany today less-educated people are more willing to engage in entrepreneurship than highly educated people.

The current labor market situation might again serve as an explanation for this result. Germany's prospering economy now provides high skill individuals with a broad range of well-paid employment. Some industries even contend that there is a shortage of skilled workers in the German economy, leading to an increased competition for, and wages paid

to, this labor segment. If correct, this situation makes entrepreneurship a less attractive career option.

These recent developments in the German job market should be taken into account by economic policy makers who seek to enhance regional innovation through technology and knowledge-based entrepreneurship. In order to do so, they have to engage in a 'war for talent' that should include the implementation of several measures. First of all, university students should be made aware of entrepreneurship as a career option as part of their studies. Student entrepreneurs should be encouraged to develop their business concepts by making the early and risky stages of entrepreneurship more financially rewarding. This can be done by, for example, providing scholarships for technology entrepreneurs – the national university entrepreneurship program EXIST[4] being a possible model. Universities with a high innovative potential (e.g., universities of technology, medical universities) should allow entrepreneurial students to access labs and use professional instruments to develop their prototypes, while academic start-up incubators could be established to provide students with access to free office space. Another important area of support for university start-ups and spin-offs concerns finding financing opportunities. This can be done through, among other things, investments by university-owned seed and investment funds, and networks that bring together students together with university alumni who are themselves successful entrepreneurs that might serve as business angels. The effectiveness of these types of activities could be enhanced through coordination by, for example, university-based entrepreneurship centers that could also serve as a cut surface for students, different university departments, and the regional entrepreneurship eco-system (incubators, innovation centers, venture capital funds).

Age

Not surprisingly, hypothesis 5 is confirmed as the age structure by region is found to be a significant predictor of entrepreneurial action. Regions with a favorable age structure (high share of people aged 30–64) experience higher business registration rates than regions with a relatively low share of that age group. These results are in line with the earlier findings of Bergmann and Sternberg [2007]. However, Germany's aging society and increasing life expectancy will likely lead to a situation in which there are more older people engaging in entrepreneurship. Indeed, *senior entrepreneurship* is getting increasing research attention [Kautonen et al., 2011; Kautonen, 2013] and has the potential to become an engine of regional economic growth in the coming decades.

In addition to taking a long-term perspective, policy makers should also consider senior entrepreneurship as a current instrument of regional economic policy. Some regions in the new federal states of Germany with a particularly high share of elderly people, and therefore relatively low entrepreneurship rates, could serve as a testing ground for pilot projects to foster senior entrepreneurship. To do so, it is important that specific measures are taken to address the needs of elderly people who often come with developed networks,

experience, and financial capital but fear complex administrative procedures and lack information or are not simply aware of entrepreneurship as a late career option [Kautonen, 2013]. A first step could be the appointment of senior entrepreneurship agents at regional citizen centers. These representatives would create awareness of entrepreneurship as a late-career option, advise seniors on legal and financial issues, and act as connectors to the regional entrepreneurship eco-system.

Social Position

The expected positive effect of close social ties on entrepreneurship is not confirmed in the case of German regions. Contrary to expectations, regional districts with a particularly high share of married individuals experience relatively low business registration rates. Compared to the results of earlier studies, this finding indicates that the characteristics of entrepreneurship are also changing in Germany[5].

One such likely change is what may be a greater number of people who do not formalize their relationships. Official data do not characterize (or capture) this segment of the population as people with close social ties, which is defined as living in a formal relationship. This may have skewed the result found in this study.

Intuitively, it would also be consistent that persons who choose to stay independent in their private lives would be more drawn to being independent (as entrepreneurs) in their professional lives, as well.

Finally, employment trends are changing, as increasing numbers of recent graduates not yet in formal relationships work as freelancers or self-employed workers.

Summing up, it seems that entrepreneurship is increasingly attracting more single persons. The financial consequences of entrepreneurial failure are, however, more threatening for this segment of the population, because they lack the support of a working spouse. The higher financial risk to single persons posed by potentially foregone income and monetary loss may discourage them to found companies, representing lost innovative potential. This problem should be addressed by policy makers.

First of all, it is necessary to provide early-stage entrepreneurs with a source of income covering living costs. Again, the EXIST academic entrepreneurship support program could serve as a positive example of how to address this situation, as it partly covers foregone income. Policy makers can expand the use of this instrument beyond systematically supporting academic entrepreneurship by extending it to any number of appropriate fields (e.g., female entrepreneurship, senior entrepreneurship etc.).

Secondly, the financial consequences of failure should be diminished. Thus, it is necessary to make the legal form of limited liability companies more accessible to individuals with little initial capital. A first step in this direction was taken in 2008 by legally establishing the so called 1 EUR GmbH (limited liability company), which allows individuals to establish limited liability companies with an initial capital investment of EUR 1, thus considerably reducing the financial consequences of entrepreneurial failure.

Research Limitations

As with every research endeavor, this study is also constrained by several limitations. First, it focuses on a very narrow understanding of entrepreneurship, namely the formal registration of a company. The very early stages of the entrepreneurial process (e.g., opportunity recognition, idea generation etc.) as well as the later aspects of entrepreneurial activity – including the company's survival, performance and growth – are outside the scope of this study.

Secondly, the study is based on regional-level data on economic and socio-demographic aspects. However, the determinants of entrepreneurship are multifold and, besides environmental aspects, also include individual-level factors such as cognitive ability, motivation and risk taking attitude, as well as more aggregated factors including culture, national, and supranational politics – none of which are discussed in this study. Future research might combine individual-level perspectives with regional or cross-country perspectives to provide a more holistic view on the determinants of entrepreneurial activity.

Thirdly, this paper uses an overall measure of entrepreneurship and does not distinguish the different types of entrepreneurship, including necessity, opportunity, knowledge and technology based entrepreneurship.

Summing up, the research presented in this paper may be viewed as a first step towards a more comprehensive research program on the rapidly changing characteristics of entrepreneurship in Germany.

Notes

[1] Wennekers and Thurik [1999] provide an overview of the different literature streams investigating the link between entrepreneurship and economic growth. The ways that entrepreneurs can influence economic growth are discussed in detail in Carree and Thurik [2003].

[2] The major explanation for these differences in sample size is the circumstance that in the analyzed time period two territory reforms were conducted in the federal states Sachsen (in 2008) and Mecklenburg-Vorpommern (in 2011). In consequence some regional districts were merged, others were disestablished.

[3] Please note that the following control variables that are typically used in similar research were deleted from the models due to co-linearity problems. Thus, population density correlated strongly positively with total population, the share of migration with marital status.

[4] EXIST is Germany's largest public entrepreneurship support program. EXIST financially supports universities but also start-ups and scientists aiming at founding a company. It provides support for one year for graduates deciding on founding a technology company (graduates receive EUR2,000/month, PhDs EUR2,500/month).

[5] A similar trend was detected by Fritsch et al. [2013].

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