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## SHORT ARTICLE

# Entrepreneurship and employment growth across European regions

Justin Doran*, Noirin McCarthy and Marie O'Connor

*School of Economics, University College Cork, Cork, Ireland*

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This research focuses on the impact of regional entrepreneurial activity on employment growth. Specifically it analyses whether new firm formation in European NUTS-2 regions can stimulate job creation and drive employment growth.

**Keywords:** entrepreneurship; European NUTS2 regions; new firm formation; fixed effects

## Introduction

The role of entrepreneurship in stimulating employment growth is a topic of much discussion (Acs, 2006; van Stel & Suddle, 2008). Van Stel and Suddle (2008) note considerable interest since Birch's (1987) assertion that small and medium-sized companies create most new jobs in an economy. One explanatory mechanism, according to Van Stel, Carree, and Thurik (2005), is that entrepreneurs can be drivers of innovation or enhance competition in an industry, which may drive productivity improvements, which in turn can positively affect employment growth (Acs, 2006). Many studies have shown a positive relationship between entrepreneurship and employment growth, but research has focused on cross-country comparisons at the national level, or at the regional level within a single country (Baptista, Escaria, & Madruga, 2008; Braunerhjelm & Borgman, 2004).

The specific research issue addressed by this paper is whether the often positive association between entrepreneurship and regional employment growth holds across diverse European regions. In light of the persistent negative effect of the 2008 economic crisis on employment levels, it is timely to consider whether entrepreneurial activity can alleviate unemployment rates through stimulating job creation. We utilize a unique dataset covering 90 European NUTS-2 regions (Nomenclature des Unités Territoriales Statistiques) in 11 countries for 2008–10, as well as a fixed effects model to control for the panel nature of the data. The results indicate that entrepreneurial activity, proxied for by new firm births, has a significant positive effect on employment growth across regions.

The paper is structured as follows. The second section provides a brief overview of the relevant literature. The third section describes the methodology and data used; the results and discussion are presented in the fourth section. Conclusions are presented in the fifth section.

*Corresponding author. Email: justin.doran@ucc.i.e.

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## Literature review

From a theoretical perspective Fritsch (2008) notes several possible mechanisms through which new firm formation can stimulate employment growth: (1) securing efficiency by contesting established market positions as (possible) new entrants force efficiency upon existing businesses; (2) accelerating structural change linked to Schumpeter's (1934) concept of creative destruction where industrial change occurs when new firms substitute for older firms; (3) amplified innovation, e.g., the creation of new markets that may not have existed before; and (4) greater variety of goods and services as the products offered by new entrants may differ from those of older firms (Fritsch, 2008). This provides strong theoretical underpinning for studying the role of the entrepreneurial process in driving employment growth at a regional level. Regions with high levels of new firm formation should see a corresponding benefit of higher levels of employment growth.

Indeed, the existing literature suggests that a positive effect on regional employment growth due to new firm formation and self-employment is evident in the United States (Acs & Armington, 2004; Rupasingha & Goetz, 2013), the UK (Ashcroft & Love, 1996), Portugal (Baptista et al., 2008), and Sweden (Braunerhjelm & Borgman, 2004). Other studies have found that new firm formation can positively or negatively impact regional employment growth dependent upon the time period considered (Fritsch, 1997; Fritsch & Mueller, 2004). However, other studies have failed to find a positive relationship in any time period between entrepreneurial activity and employment growth (Audretsch & Fritsch, 1994). Fritsch (2013) notes that the effect of entrepreneurship on employment is still an under-researched subject area.

However, one must also consider the measurement of entrepreneurship. New firm creation is extensively used as a proxy for entrepreneurial activity within the existing literature (Acs & Armington, 2004; Audretsch & Fritsch, 2002). Baliamoune-Lutz (2015) suggests that the use of firm births as a proxy for entrepreneurship is appealing as an entrepreneur will often have to set up a firm in order to exploit the profit-generating innovation that he/she has perceived. This suggests that the birth of new firms should be highly and positively correlated with entrepreneurship (Acs & Armington, 2004). However, there are also limitations to the use of firm births as a proxy for entrepreneurship. Baliamoune-Lutz (2015) notes that one problem is that entrepreneurship is not confined to start-ups but might also take place in large and well-established firms. Also, the use of firm births may be an overly simplistic interpretation of entrepreneurship.

Despite these limitations, firm births are extensively used in the empirical literature as a proxy for entrepreneurship. Audretsch and Fritsch (2002) and Fritsch and Mueller (2004) utilize new firm start-ups as a measure of entrepreneurial activity in West Germany. Baptista et al. (2008) and Acs and Armington (2004) also use new firm formation in their studies of the impact of entrepreneurship on employment growth within the regions of Portugal and the United States respectively.

## Methodology and data

We analyse the impact of regional entrepreneurial activity (proxied for by new firm formation) on regional employment growth. While some papers utilize distributed lag models to accomplish this, due to the relatively short time period available from EUROSTAT (the Statistical Office of the European Communities), we develop a model where employment growth depends upon contemporaneous firm births (Baptista et al., 2008; van Stel & Suddle, 2008). By utilizing regional cross-country data we are, to the

authors' knowledge, the first to consider diverse NUTS-2 regions of select European countries. The model estimated is as follows:

$$\Delta E_{it} = \beta_0 + Births_{it}\beta_1 + X_{it}\beta_2 + \mu_i + \delta t + \varepsilon_{it}$$

where $i$ indicates region and $t$ indicates time; $\Delta E_{it}$ is the change in log employment[1]; and $Births_{it}$ is the number of births divided by the total number of persons employed in the region in which the firm is located. Audretsch and Fritsch (1994) discuss the measurement of new entry and note that the absolute number of new entrants must be standardized to allow for meaningful comparisons across markets of different sizes. We follow their suggestion to standardize the number of new entrants with respect to the size of the workforce. Firm births are defined following EUROSTAT's (2015a) Business Demography dataset to include any new business start-up including those that are owner run (i.e., have no employees). $X_{it}$ is a matrix of control variables. The full list of control variables is displayed in Table 1. $\beta_i$ is the associated coefficient; $\mu_i$ is a vector of region fixed effects; $\delta t$ is a vector of time-fixed effects; and $\varepsilon_{it}$ is a random error term. The use of employment growth rates is consistent with the existing literature (Acs & Armington, 2004). The use of the natural logarithms of continuous variables mitigates for non-normal distributions. Also, as the data are panel in nature consisting of region and time fixed effects, we estimate equation (1) using fixed effects.[2]

The data utilized are derived from EUROSTAT. The advantage of utilizing the EUROSTAT (2015a) Business Demographics database is that it provides information across diverse NUTS-2 regions of Europe on firm births, which is unavailable from other sources. Ideally we would like to analyse all European countries, however data from EUROSTAT on business demographics are limited. Likewise, while we would like to extend the time period analysed, however, data are only available for the period 2008–10. While data are available for individual countries for longer periods, they are simply not available in a truly pan-European context. Table 1 presents a brief definition of the variables as well as relevant descriptive statistics. Regarding the definition of firm

Table 1. Descriptive statistics of variables.

| Variable | Definition | Source | Mean | SD |
|---|---|---|---|---|
| Variable | Definition | Source | Mean | SD |
| Employment Growth | Percentage growth in employment from one year to the next in the region | EUROSTAT (2015e) | −0.98% | 2.50% |
| Firm Births | New firm formation in the region divided by the number of people employed in the region | EUROSTAT (2015a) | 2.53 | 0.50 |
| High Growth Firms | Proportion of firms in the region deemed to be high-growth firms | EUROSTAT (2015a) | 6.09% | 0.92% |
| Enterprise Density | Number of enterprises in the region divided by the size of the region in square kilometre | EUROSTAT (2015a) | 11.07 | 1.20 |
| Third Level Education | Percentage of the population with a third-level qualification in the region | EUROSTAT (2015d) | 21.50% | 8.96% |
| Science and Technology | Percentage of the population employed in science and technology (S&T) sectors in the region | EUROSTAT (2015b) | 5.19% | 12.11% |
| Industrial Employment | Percentage of the population employed in industrial sectors in the region | EUROSTAT (2015e) | 18.58% | 7.07% |
| GDP Growth | Percentage change in gross domestic product (GDP) from one year to the next in the region | EUROSTAT (2015c) | 0.33% | 6.43% |

births, we do not consider the absolute number of firm births but instead follow Audretsch and Fritsch (1994) and Baptista et al. (2008) by utilizing the number of firm births divided by the number of persons employed in the region. While ideally we would like to distinguish between new firm formation by sector, this is not possible given the existing data available from EUROSTAT (2015a). To measure the extent to which high-growth firms are present in a region, we also control for the percentage of high-growth firms as these rapidly growing existing firms may contribute significantly to employment growth. A high-growth firm is defined in the EUROSTAT (2015a) Business Demographics database as having a growth rate of employment in excess of 10% in a given year. Likewise, following the arguments made by Fritsch (1997) in relation to agglomeration effects, enterprise density is included in the analysis. This is measured as the number of establishments per square kilometre. We control for the impact of educational attainment on employment growth by including the proportion of workers with a third-level education. In an attempt to control for the technological level of a region, we include the proportion of the workforce employed in science and technology (S&T) sectors. To control for structural composition, we include the proportion of the workforce in industrial employment (which is defined as NACE sectors B–E – Nomenclature statistique des activités économiques dans la Communauté européenne). Finally, we include the rate of gross domestic product (GDP) growth of the region.

We note that employment growth on average across the regions in the period 2008–10 was negative. There is substantial variation across regions with some experiencing employment growth as high as 4.24%, while others experienced employment

Table 2. Summary of employment growth and firm formations by country.

| Country | Employment growth | Births/employed |
|---|---|---|
| AT | 0.52% | 1.77 |
| | (1.17) | (0.19) |
| BG | −2.36% | 2.69 |
| | (4.44) | (0.32) |
| ES | −2.86% | 2.57 |
| | (2.96) | (0.15) |
| FI | −0.66% | 2.58 |
| | (2.11) | (0.13) |
| HU | −1.39% | 2.76 |
| | (2.00) | (0.14) |
| IT | −4.59% | 2.56 |
| | (1.72) | (0.18) |
| NL | −0.35% | 2.64 |
| | (2.11) | (0.18) |
| PT | −1.39% | 3.45 |
| | (1.57) | (0.27) |
| RO | −0.43% | 1.73 |
| | (1.80) | (0.50) |
| SI | −0.62% | 2.77 |
| | (1.54) | (0.23) |
| SK | −0.50% | 3.24 |
| | (2.95) | (0.25) |
| Total | −0.98% | 2.53 |
| | (2.50) | (0.50) |

Note: Mean values are presented with standard deviations in brackets.

Table 3. Estimates of equation (1).

| Variables | Fixed effects |
|---|---|
| Constant | 2.0365*** |
| | (0.6137) |
| Firm Births | 0.0436*** |
| | (0.0146) |
| ***Control variables*** | |
| High Growth | 0.0223*** |
| | (0.0079) |
| Enterprise Density | −0.2831*** |
| | (0.0370) |
| Education | 0.0209 |
| | (0.0379) |
| S&T Employment | 0.0509 |
| | (0.0594) |
| Industrial Employment | 0.5190*** |
| | (0.1754) |
| GDP Growth | 0.0673* |
| | (0.0426) |
| Observations | 270 |
| *F* | 17.7 |
| Prob > *F* | 0.0000 |

Notes: ***, ** and *Significance at the 1%, 5% and 10% levels respectively.
Regional and time fixed effects are included.
*High Growth*, *Enterprise Density*, *Education*, *S&T Employment* and *Industrial Employment* are entered into the regression in natural logarithms.

losses of up to 10%. Regarding firm births, there is substantial regional variation in the distribution of firm births across regions. We present a correlation matrix of the independent variables in Appendix 1 as a test of potential multicollinearity. We note that the correlation coefficients between variables lie below |0.8|, suggesting that the correlations are below the threshold at which one might anticipate problems associated with multicollinearity.

Table 2 presents the mean and standard deviation (SD) for regional employment growth and new firm formation per persons employed by country. The 90 regions are drawn from 11 countries.[3]

Note that employment growth was typically negative during the time period studied due to the 2008 economic crisis, with Austria being a notable exception. The number of new firm births per person employed varies from 1.73 in Romania to 3.45 in Portugal. However, the SDs suggest that there is substantial regional heterogeneity within countries.

## Results and discussion

Table 3 presents the results of the empirical analysis. The results show that new firm formation has a positive effect on the employment growth of regions. This is consistent with the findings of several existing studies, which focus on cross-country national data or the regions of a single country (Acs & Armington, 2004; Fritsch, 2008; van Stel & Suddle, 2008). This positive relationship holds for our pan-European panel of regions even when controlling for regional fixed effects and other possible determinants of employment growth.

We also observe that a greater number of high-growth firms in a region further stimulates employment growth. Regions with more of a specialization in industry experienced higher growth in employment and regions with higher rates of GDP growth also experienced higher employment growth. However, regions that had a higher density of existing establishments had lower levels of employment growth. When controlling for these factors it was observed that educational attainment of a region did not impact on employment growth.

The finding of a positive relationship between entrepreneurship and employment growth presents a clear indication that fostering entrepreneurship can lead to increased employment across European regions. Van Stel and Suddle (2008) note that when considering the role of policy in stimulating entrepreneurship there is often an overt focus on immediate, short-term gains in employment, with the long-run benefits often being ignored. While it is not possible to distinguish between short- and long-run outcomes in our analysis (due to the short time period of data available), we provide evidence that fostering entrepreneurship can be used as a mechanism to tackle areas of low employment across European regions, suggesting that there is indeed a justification for policy-makers to support entrepreneurship as a mechanism to stimulate employment growth.

## Conclusions

This paper has analysed the importance of entrepreneurial activity, proxied for by new firm formation, for employment growth. It contributes to the existing literature by considering a sample of pan-European regions rather than by focusing on the regions of a single country or on a group of countries. It finds that entrepreneurship positively effects employment growth across European regions. This highlights the importance of the entrepreneurial process in the generation of new employment opportunities within regions resulting in a faster pace of employment growth. This finding is timely as many European regions are continuing to struggle with relatively low employment levels compared with their pre-2008 economic crisis paths. We suggest that the support and development of an entrepreneurial environment may stimulate employment growth within regions and contribute to their economic recovery post-crisis.

However, we note that while new firm formation is extensively utilized in existing literature to proxy for entrepreneurship, there are a number of limitations to this measure (as highlighted in the literature review section). Alternative measures of entrepreneurship, such as the data collected by the Global Entrepreneurship Monitor (GEM), could be used to provide future studies with a more nuanced measure of entrepreneurship. However, these data are not available at a regional level across the European countries analysed in this paper. In addition, the analysis raises some possibility for future research where individual countries could be assessed on a case study basis to analyse the extent to which specific institutional differences across countries may help or hinder the entrepreneurial process.

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## Disclosure statement

No potential conflict of interest was reported by the authors.

## Notes

1. The change in log employment equates to the exponential growth rate of the variable.
2. We also utilize an instrumental variable fixed-effects estimation to control for potential endogeneity between $\Delta E_{it}$ and $Births_{it}$ by employing Bartlett's three-group method and a synthetic instrument method (Le Gallo & Paez, 2013). However, when we estimate the model using these two instruments, the generalized method of moments (GMM) C Statistic $\chi^2$ test of exogeneity suggests that births are exogenous and, therefore, we can interpret the results of the standard fixed-effects model with confidence. Therefore, we consider only the standard fixed-effects estimates.
3. In total these countries contain 100 NUTS-2 regions. Data are not available for five Spanish regions, one Finnish region, two Italian regions and two Portuguese regions.

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## Appendix 1. Correlation matrix

| Variables | Firm Births | High Growth | Enterprise Density | Education | S&T Employment | Industrial Employment | GDP Growth |
|---|---|---|---|---|---|---|---|
| Firm Births | 1 | | | | | | |
| High Growth | 0.3575 | 1 | | | | | |
| Enterprise Density | 0.4391 | 0.535 | 1 | | | | |
| Education | 0.2424 | 0.2876 | 0.2879 | 1 | | | |
| S&T Employment | −0.048 | 0.2685 | 0.1143 | −0.1056 | 1 | | |
| Industrial Employment | 0.2949 | 0.1112 | 0.0012 | −0.081 | −0.1726 | 1 | |
| GDP Growth | 0.0783 | 0.1145 | 0.4612 | 0.448 | 0.0251 | −0.0447 | 1 |