Unemployment as a factor of entrepreneurial activity

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We aim to investigate the nature and direction of the relationship between unemployment and entrepreneurial activity. Our research, using monthly data from Romania (1991-2012), brings evidence to the hypothesis that the relationship is non-linear in regard to the temporal delay factor. From our data it would seem that unemployment and entrepreneurial activity are negatively related on the short term, and positively related on the long term. Based on these results, we propose that the two effects be treated separately, and we propose two predictive models of entrepreneurial activity based on unemployment that follow this distinction.

Keywords: Romania; entrepreneurship; unemployment rate; company birth rate; predictive model

JEL Classifications: L260, J600

Introduction

Entrepreneurship is an active field of contemporary research, following on the recent focus and importance given to small and medium enterprises (SME). In the early 20th century, large enterprises

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were considered to be the most important area of economic research. Small companies were given less importance due to the opinion that they had low efficiency, low wages and were seen as less innovative (Faria, Cuestas, and Mourelle 2010). However, due to recent technological development and economic instability, small enterprises are now 99% of the total number of companies in the European Union, providing 2/3 of the jobs in the private sector (Dodescu and Bădulescu 2009).

Consensus in a general definition of entrepreneurship is relatively low, most authors choosing to provide their own definition, leading to either complex and general definitions such "the doing of new things or the doing of things that are already being done in a new way"(Schumpeter 1947, 151) or to functional definitions used in research, where a relative consensus exists in seeing the entrepreneur as the person that either works for himself or that starts a new company (Van Der Sluis, Van Praag, and Vijverberg 2008, 803).

In our paper we will also use this functional definition, of the entrepreneur as the person that starts a new company, and therefore we will use as a measure of entrepreneurial activity the number of new companies registered in a certain time frame.

Unemployment is widely spread in the current economy, and is seen as "a negative phenomenon, characterized by a countries inability of providing jobs for all the citizens that are able to work" (Olah 2004, 194–195).

The influence of unemployment on entrepreneurship has been suggested at least from the year 1943, when Oxenfeldt claimed that entrepreneurship is "providing some individual with an escape from unemployment and others with an escape from the insecurity and humiliation that sometimes attach to employment in the business of another"(Oxenfeldt 1943, 186).

This approach follows on Knight's theory formulated in 1921 (apud D. B. Audretsch & Keilbach, 2008), which claims that each individual

has a choice between three states: unemployed, employee or entrepreneur, and that the choice is based on the relative costs of these activities.
Therefore one can claim that when unemployment is high, there are few jobs, and the optimum choice for some people could be entrepreneurship. This effect has been called the "refugee effect" or the "push effect" (D. Audretsch, Carree, and Thurik 2001).
Some have proposed an opposite effect, according to which entrepreneurship influences unemployment, called "the pull effect" or the "Schumpeter effect"(D. Audretsch, Carree, and Thurik 2001). According to this theory an increase in entrepreneurial activity leads to a decrease of unemployment, due to the hiring of previous unemployed individuals, but also as a consequence of the increased economic growth, that comes with a growing number of companies (D. Audretsch, Carree, and Thurik 2001).

Current research status

Many studies investigate the factors of entrepreneurship, and it's relationship with unemployment, however the results of these studies are seemingly contradictory: some studies find a positive correlation between the two, (Ritsilä and Tervo 2002; Brixy, Sternberg, and Stüber 2012; Theunissen et al. 2009), some find a negative correlation (D. Audretsch and Fritsch 1994) and some studies have not found a significant relationship (Noorderhaven 2004; D. B. Audretsch and Keilbach 2008).
While sampling error or natural variation could explain some of these variations, a frequent theory if that the geographical factor might play a role as well. Some authors claim that there are differences between countries or regions, as well as a non-linear relationship between the two variables (Faria, Cuestas, and Mourelle 2010; Congregado, Golpe, and Carmona 2010).

Current research is generally correlational in nature, and therefore a causal relationship is difficult to establish, however some preliminary results indicate that at least some criteria of causality are reached, and that a bi-directional causal relationship is likely (Faria, Cuestas, and Mourelle 2010).

Further evidence comes from the entrepreneurial training programs, which seem to be more effective in the case of unemployed persons (Michaelides and Benus 2012), which again suggests that there might be a link between being unemployed and becoming an entrepreneur.

Table 1

Literature review of papers investigating the relationship between unemployment and entrepreneurship

Study	Country	Relationship	Delay
(Berglann et al. 2011)	Norway	Positive	1 year
(Brixy, Sternberg, and Stüber 2012)	Germany	Positive	4 years
(Congregado, Golpe, and Carmona 2010)	Spain	Non-linear	¼ years
(D. Audretsch and Fritsch 1994)	Germany	Negative	1-2 years
(D. B. Audretsch and Keilbach 2008)	Germany	No significant relationship	0 years
(Faria, Cuestas, and Mourelle 2010)	9 OECD countries	Non-linear	2-4 years
(Noorderhaven 2004)	EU15	No significant relationship	2 years
(Ritsilä and Tervo 2002)	Finland	Positive	1 year
(Theunissen et al. 2009)	Belgium	Positive	-
(Cowling and Bygrave 2002)	37 countries	Negative short term / positive long term	0, 1 and 2 years
(D. Audretsch, Carree, and Thurik 2001)	8 OECD countries	Positive	4, 8 and 12 years
(Thurik et al. 2008)	23 OECD countries	Positive	0 – 20 years

One can observe in Table 1 that the sample of current studies that we have reviewed provides seemingly contradictory results, even in the case of the same country (Germany). However using different time delays as well as different country populations might explain at least some of these differences.

Therefore we aim to expand these results to the Romanian population of companies. In order to try to better explain the possible relationship in the case of Romania, we also aim to use several temporal delays, and to use monthly data, as opposed to the quarterly or yearly data generally used. We hypothesize that this will offer us a finer grain view of the relationship and allow us to reach a satisfactory level of statistical power.

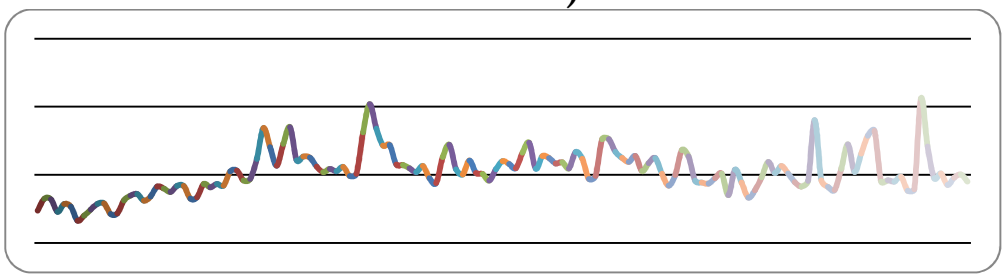
Research methodology

1. Chosen indicators

In order to measure the volume of entrepreneurial activity we choose as an indicator the number of new companies being registered into The National Trade Register Office each month. The data was collected from the online platform of the Office, and includes monthly data from the January 2001 – September 2012 period.

Figure 1

The montly number of newly registered companies (01.2001 - 09.2012)

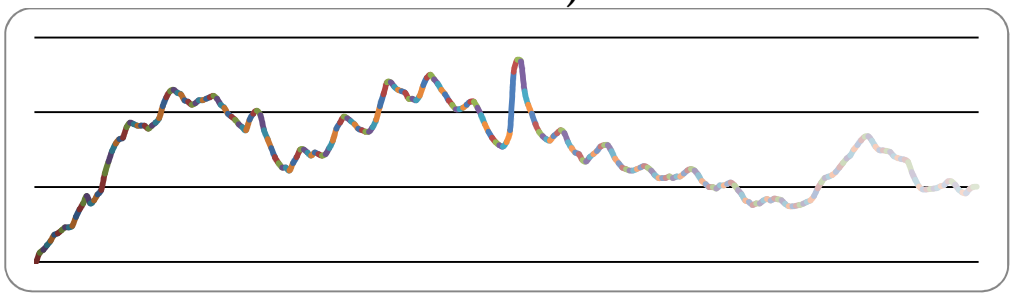


Source: Romanian National Trade Register Office

The indicators chosen for unemployment were the monthly national unemployment rate and the total number of unemployed persons at the national level. The data was collected from the online platform of the National Employment Agency, and covers the February 1991 – May 2012 period.

Figure 2

Monthly national unemployment rate in Romania (02.1991 - 05.2012)

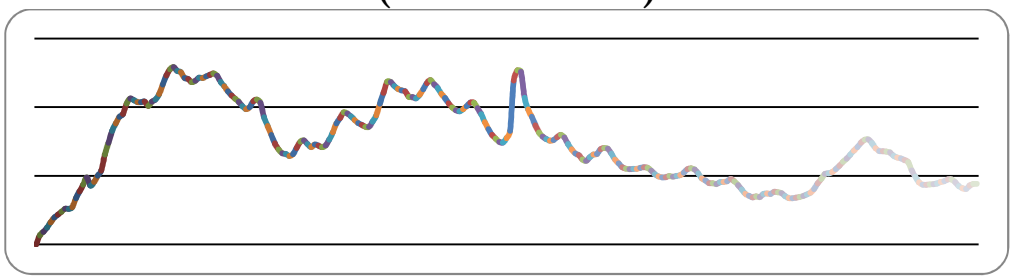


Source: Romanian National Employment Agency

Since the relationship between the two indicators is, as expected, very strong ($r = 0.975$, $p<0.001$), for the sake of parsimony we decided to only use the monthly national unemployment rate in the following analysis. We believe this will aid in comparing our results with those of similar studies conducted in other countries.

Also we choose to use the number of registered unemployed persons, rather than try and estimate the total number of real unemployed persons for several reasons: the data is readily available and easily comparable with previous research date and, in the case of Romania, the relationship between total and registered unemployment seems to be highly linear, at least from 1994 onwards (Bădulescu 2006).

Figure 3
Total number of registered unemployed persons in Romania (02.1991 - 05.2012)



Source: Romanian National Employment Agency

Data analysis was conducted using R 2.15.2 and G*Power 3.1.

2. The relationship between unemployment and entrepreneurship

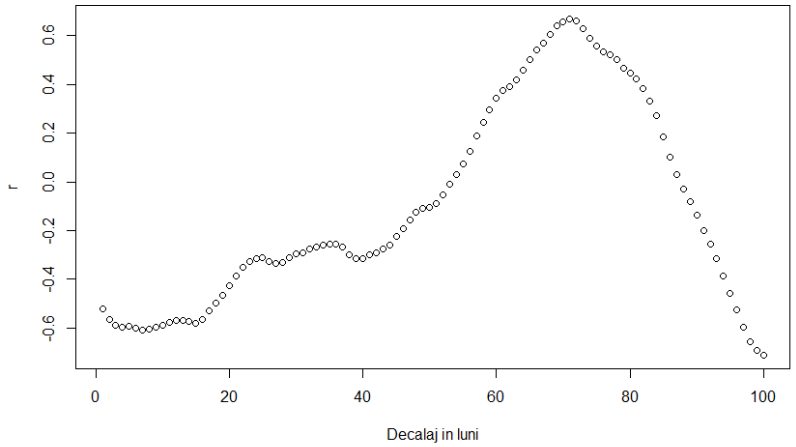
Based on our previous literature review (Congregado, Golpe, and Carmona 2010; Faria, Cuestas, and Mourelle 2010) we expect that the relationship between the two variables be a complex, time delayed one. In order to find the optimum delay, we choose to generate all the correlation coefficients for delays in the 1 month – 100 months interval.

As one can observe in Figure 4, the time delayed relationship does not follow a linear path. Instead, on the short term, there is a significant negative correlation (with a local minimum at 7 months), followed by a plateau phase nearing 0 correlation, and a strong, significant, positive correlation on the long term (with an absolute maximum at 71 months). On the very long term the relationship seems to return to the negative.

Our results are similar to those of Audretsch et al., who in series of studies also observed a maximum only on the long term, 96 months in their case (Thurik et al. 2008; D. Audretsch, Carree, and Thurik 2001).

Figure 4

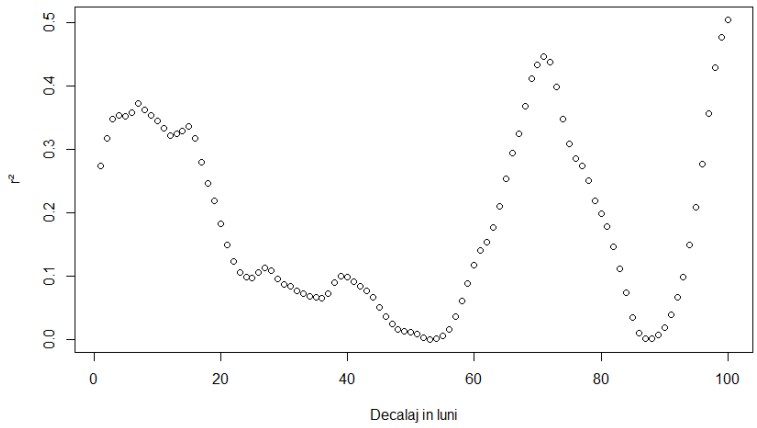
Correlation coefficients between unemployment rate and company birth as a function of time delay



Source: Created by the author based on date from the Romanian National Trade Register Office and Romanian National Employment Agency

We also computed the determination coefficient (Figure 5), to more easly observe the variation in the effect size of the relationship. Noticably, on the short term the effect size is average (up to 18 months), then on the 20-60 month range it's small, and then on the long term we have a large effect size.

Figure 5
Determination coefficients between unemployment rate and company birth as a function of time delay



Source: Created by the author based on date from the Romanian National Trade Register Office and Romanian National Employment Agency

The extreme values after the 90 month delay might suggest another effect type, however we advise caution, as due to the smaller sample due to cut-off points the statistical power at this section is low.
In the following section we aimed at testing the predictive capabilities of unemployment rate on the number of new companies being born in the following period. For this purpose we build two regression models, one using the short term effect (7 months) and one using the long term effect (71 months).
As previously stated at both points there exists a significant correlation between the two variables. For the interested reader, we provide the details of these correlations in Table 2.
The narrow confidence intervals, strong effect sizes and high statistical power further support our hypotheses.

Table 2

Correlation coefficient between unemployment rate and company births in Romania

Variables	R	CI	df	p	1-β
Unemployment rate (-7) – Company births	-0.609	-0.705 -0.491	133	<0.01	1
Unemployment rate (-71) - Company births	0.668	0.515 0.780	69	<0.01	0.99

The short term model has an ANOVA F (1,133) = 78.72, with a significance level of p < 0.01, therefore we can assume that the predictive capacity of the model significantly exceeds that of using just the sample average.

Table 3

Short term model regression coefficients significance testing

Variable	Coeff.	Std. Err.	t test	p
Intercept	17073.2	780.8	21.865	< 0.01
Unemployment (-7)	-1049.2	118.3	-8.872	< 0.01

The significance values of the t tests for the coefficients confirm the ANOVA test results, and show that unemployment rate is an effective predictor of short term entrepreneurial activity.

The short term regression equation is:

*Monthly company births = 17073.2 – 1049.2 * Unemployment rate delayed by 7 months.*

The predictive capabilities of the model are limited, being only able to explain 36.71% of the number of company births, on the short term.

Table 4

Short term model R^2 coefficients

R^2	Adjusted R^2
0.3718	0.3671

The long term model has an ANOVA F (1,69) = 55,74, with a significance level of p < 0.01, therefore we can assume that the predictive capacity of the model significantly exceeds that of using just the sample average.

Table 5

Short term model regression coefficients significance testing

Variable	Coeff.	Std. Err.	t test	p
Intercept	316.0	1302.4	0.243	0.809
Unemployment (-71)	1736.1	232.5	7.466	< 0.01

The significance values of the t tests for the coefficients confirm the ANOVA test results, and show that unemployment rate is an effective predictor of long term entrepreneurial activity.
The long term regression equation is:
*Monthly company births = 316.0 - 1736.1 * Unemployment rate delayed by 71 months.*

Table 6

Short term model R^2 coefficients

R^2	Adjusted R^2
0.4469	0.4389

The predictive capabilities of the model are limited, being only able to explain 43.89% of the number of company births, on the long term.
For both models we tested the basic assumption of the linear models. Linearity was tested using a plot of residuals versus predicted values,

which seem to be symmetrically distributed around a horizontal line for both models, thus supporting the linearity assumption.

The independence of the errors was tested using autocorrelation plots of the residuals. The long term model performed less then optimal (we expected this result, due to it having less data points and a very long delay and thus being more prone to interference), however the short term model showed no significant signs of violation of error independence.

The normality of the error distribution was tested with the Shapiro-Wilk test, which rejected the hypothesis that they were symmetrically distributed and therefore we have strong evidence to assume that this assumption was violated for the short time model ($W = 0.91$, p-value < 0.01) and for the long term model the Shapiro-Wilk test failed to reject the hypothesis that they were symmetrically distributed ($W = 0.96$, p-value $= 0.07$) and therefore the assumption has been met.

Homoscedasticity was tested using the Breusch–Pagan test, which failed to detect any violations of this assumption, for both models (short term model $BP = 7.2917$, $df = 4$, p-value $= 0.1213$, and for the long term model $BP = 2.8263$, $df = 1$, p-value $= 0.09273$).

The short term model seems to follow the assumptions required for a linear model, with the exception of the normality of the error distribution. Further analysis seems to indicate that this is caused by several outliers in the 4^{th} quartile of the error distribution. In the original data set, this translated to a dramatic (200.8%) increase in new company births in the range of 3 months. Since this is most likely a singular event, outside of the normal predictive capabilities of the model we decided to eliminate the residuals, assuming they occurred due to unsystematic error, and repeating the test without the three values resulted in failure to reject normality ($W = 0.9792$, p-value $= 0.3422$).

Taking into account this correction, we have no evidence no assume that the short term model breaks the basic assumptions of the linear model, and we conclude it to be a valid model.
The long term model shows minor signs of violation of independence of errors, however it follows the others assumptions, and we can conclude that it is also a valid model.

IV. Conclusion

Previous studies have shown apparently contradictory results regarding the relationship between unemployment and entrepreneurship, which has lead some researchers to question whether such a relationship even exists (Remeikiene and Startiene 2009).
Our study aimed to expand this field of research on the Romanian population, as well as to try and explain this complex relationship.
Our results confirm the existence of a strong relationship between the two variables, assuming one uses an optimal time delay.
On the short term the relationship is negative, an increase of unemployment predicting, for instance, a decrease of entrepreneurial activity in the following months. This can be explained by several effects coexisting. An increase in unemployment can signal difficulties at the level of the nation economy, which is generally detrimental for new companies trying to enter the market (D. Audretsch, Carree, and Thurik 2001; Thurik et al. 2008). In Romania, unemployed persons benefit of social aid on the short term (approximately 1 year), which overlaps with the maximum negative relationship and this form of social aid has been reported to have a negative impact on entrepreneurship in general (Cowling and Bygrave 2002) and also specifically in Romania (Earle and Pauna 1998). Therefore these effects might cause entrepreneurial activity to drop as unemployment rises.

Based on our model we can estimate the rate of this change. For instance an increase of unemployment rate with 1% predicts (with 36.71% accuracy) a drop with 1049 in the number of new company births 7 months later.

On the long term however the relationship is positive, for instance an increase in unemployment predicting an increase in entrepreneurial activity. This supports the "push effect" identified by most of the long term studies conducted by other research teams (Ritsilä and Tervo 2002; Brixy, Sternberg, and Stüber 2012; Theunissen et al. 2009).

Based on our model we can estimate the rate of this change. For instance an increase of unemployment rate with 1% predicts (with 43.89% accuracy) an increase with 1736 in the number of new company births 71 months later.

In conclusion our paper finds evidence to support the hypothesis that the relationship between unemployment and entrepreneurial activity is complex (in respect with the time delay) and possibly bidirectional (Faria, Cuestas, and Mourelle 2010; Congregado, Golpe, and Carmona 2010; Faria, Cuestas, and Gil-Alana 2009).

In the case of Romania, the two effects are most visible at 7 months ("the Schumpeter effect") and 71 months ("push effect"). Also the data might suggest that on the short term unemployment benefits might hinder entrepreneurship initiatives, a hypothesis that we aim to test in a follow-up study.

The limits of our study include using national data, some studies showing regional effects (Cheng and Li 2010; D. B. Audretsch and Lehmann 2005). We have also omitted including gender as a variable, even though some studies show differences in both entrepreneurial activity (Badulescu 2010; Badulescu 2011) and its relationship to unemployment (Evans and Leighton 1990) as a function of gender. These two limits were due to the availability of the data, especially regarding the gender of the entrepreneurs.

Another limit is tied to potential moderator and mediators of this relationship, such as GDI, financing sources and costs, living standards, inflation, etc. Such a complex model, while being able to explain more variance, might prove to be difficult to construct, due to having far less data points (quarterly data, at best) and thus having less reliability.

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