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THE ECONOMICS OF NEW ENTERPRISES, THE NUMBER OF BUSINESSES AND ECONOMIC GROWTH ACROSS THE EU DURING 2008-2017

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Abstract
The paper looks into five measures of entrepreneurship – namely, the birth rate of enterprises, the death rate of enterprises, the number of 3-year-old enterprises, the employment share of five-year-old enterprises, the average size of five-year-old enterprises- across the European Union from 2008 to 2017. The paper also econometrically analyses growth rates in the number of businesses and the Gross Domestic Product in each EU member-state in the 2008-2017 period and compares their long-run trends. Having noted a good number of similarities it makes a number of potentially useful recommendations on the basis of findings emanating from the birth and death rates of enterprises and other statistics in order to enhance business participation (hence, competition) and economic performance across the EU and beyond.

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Section 1. Introduction

The paper looks into key-aspects of entrepreneurship in the secondary and tertiary sectors (excluding activities of holding companies) across the European Union (EU). Conceptually, entrepreneurship is the activity of successfully executing an idea, i.e., of developing, organizing, and running an enterprise -in the context of this paper: a business idea and business enterprise- by bringing together the necessary agents or factors, and overcoming uncertainties and difficulties. Entrepreneurship, along with the function and the economics of new enterprises (their theory, their measurement, their quantifiable data) constitute an important subject in international literature: a literature running from Schumpeter (1934) to Wong *et al.* (2005), Acs and Szerb (2007), Bosna *et al.* (2020), and others. Acknowledging the role of new businesses in (a) serving and promoting the interests of an individual entrepreneur, and (b) creating and adding value for society, the author's intent is to supply some insights, and provide fellow students with useful information on the prospect of starting their own businesses.

Methodologically, the paper adopts a quantitative, empirical research, approach, and in the pages that follow: (i) Section 2 uses indices to study via indices the evolution of business births, deaths, survival, size and employment in 27 of the 28 EU member-states in the 2008-2017 period (roughly from the time the international and economic crisis reached Europe to the time Brexit negotiations commenced), based on annual figures provided by Eurostat (ec.europa.eu/Eurostat; there are no data on Greece). (ii) Section 3 econometrically analyzes the annual growth rates of Gross Domestic Product (GDP) and of the number of enterprises (companies), based on annual figures provided by Eurostat for each and every member state. (iii) Section 4 provides the conclusions.

Section 2. Business births, deaths, survival, size and employment

We commence by looking into the Birth and Death Rates of businesses. These are defined as follows:

$$\text{Birth Rate} = \frac{\text{number of enterprise births in the reference year (t)}}{\text{number of active enterprises in the reference year (t)}},$$

$$\text{Death Rate} = \frac{\text{number of enterprise deaths in the reference year (t)}}{\text{number of active enterprises in the reference year (t)}},$$

and they are rendered comparable via a Min-Max normalization procedure on a zero-to-ten scale. It goes as follows: Regions, *i*, with extreme values (outliers) below the 4th percentile and above the 96th percentile are assigned scores of zero and ten, respectively, and all other regions are assigned a score of $\hat{x}_i$ or $\check{x}_i$:

To facilitate comparisons across space (states) and time, values are normalized on the zero-to-ten scale via the Min-Max procedure proposed by OECD (2018). It goes

as follows: Member states, *i*, with extreme values (outliers) below the 4th percentile and above the 96th percentile are assigned scores of zero and ten, respectively; and all other regions are assigned a score of $\hat{x}_i$ or $\check{x}_i$:

$$\hat{x}_i = \frac{x_i - \min(x)}{\max(x) - \min(x)} \times 10 \quad (1)$$

$$\check{x}_i = \frac{\max(x) - x_i}{\max(x) - \min(x)} \times 10 \quad (2)$$

when higher and lower values, respectively, relate to the situation desired:

Table 1. The average birth rate and death rate indices in the 27 EU member states, 2008-17

	Countries	Average BRI (2008-2012)	Average DRI (2008-2012)	Average BRI (2013-2017)	Average DRI (2013-2017)
1	Austria	2.478	7.527	0.581	8.229
2	Belgium	1.339	9.978	0.009	9.996
3	Bulgaria	7.099	4.705	5.217	2.822
4	Croatia	2.690	3.694	2.239	5.535
5	Cyprus	0.136	7.457	1.615	7.459
6	Czech Republic	3.434	5.849	2.131	5.897
7	Denmark	4.673	4.011	4.276	3.576
8	Estonia	5.946	4.361	4.173	5.848
9	Finland	3.681	6.746	1.035	7.491
10	France	4.974	7.290	3.105	8.963
11	Germany	2.966	6.009	0.631	6.209
12	Hungary	3.700	4.041	4.116	4.509
13	Rep. of Ireland	1.316	5.231	1.055	8.121
14	Italy	1.750	7.428	0.864	6.706
15	Latvia	8.699	2.804	8.162	4.688
16	Lithuania	9.491	0.372	10.000	0.012
17	Luxembourg	3.703	6.824	2.868	6.440
18	Malta	1.004	7.238	3.857	6.351
19	Netherlands	5.012	6.489	3.164	7.556
20	Poland	6.020	4.582	5.474	3.745
21	Portugal	6.003	0.700	8.232	0.578
22	Romania	5.192	1.650	4.983	4.773
23	Slovakia	6.931	4.636	6.377	3.558
24	Slovenia	4.537	6.472	4.415	5.888
25	Spain	2.349	5.393	2.695	5.544
26	Sweden	2.067	7.824	0.612	8.047
27	United Kingdom	5.019	3.849	7.454	3.560
	Average	4.156	5.302	3.679	5.633

Source: Eurostat, author's own calculations.

Table 1 supplies the Birth Rate Index (BRI) and the Death Rate Index (DRI) for the first and second half of the period studied. These values suggest that over time three countries (namely, Cyprus, Hungary, Spain) improved their relative rankings in both measures (Cyprus, marginally in terms of DRI), four countries (Lithuania, Malta, Portugal, the United Kingdom) improved their relative BRI rankings, thirteen countries (namely, Austria, Belgium, Croatia, Estonia, Finland, France, Germany, the Rep. of Ireland, Latvia, the Netherlands, Romania, Sweden and, marginally, Czech Republic) improved their relative DRI rankings, while the rest (Bulgaria, Denmark, Italy, Luxembourg, Poland, Slovakia, Slovenia) deteriorated in both. Perhaps the practices and policies employed in the cases of improvement (type A countries) should be considered by the rest, and the practices and policies employed in the cases of deterioration should be modified or abandoned.

Next, we consider the Survival Rate of 3-year-old enterprises, which is defined as follows:

$$Survival\ Rate = \frac{number\ of\ enterprises\ in\ the\ reference\ period\ (t)\ born\ in\ t-3\ and\ surving\ to\ t}{number\ of\ enterprise\ births\ in\ t-3}$$

Table 2 supplies the Survival Rates (SR) for the entire period, and the Survival Rate Index (SRI) for the first and second half of the period. SR values reveal that in 26 of the 27 EU member-states more than half of new businesses survived three years later – quite an encouraging statistical finding for those contemplating to engage is such an activity, esp. in Malta, Belgium, Sweden, and the Republic of Ireland, where more than 70% of new businesses survived. (Malta's statistics date to the second half of the periods under consideration.) At the same time, SRI values calculated via expression (1), suggest that over time two countries (namely, the Rep. of Irel-and and Slovakia) improved their relative rankings. So, perhaps the practices and policies employed in the Republic of Ireland, Belgium and Sweden in the first half of the period, and in Malta and Slovakia in the second half of the period, should be considered by the rest.

We also turn to the Employment Share (ES) and mean Size in terms of Employees (SE) of five year-old enterprises, which are defined, respectively, as follows:

$$\text{Employment Share of } 5-\text{year}-\text{old enterprises} = \frac{\text{number of persons employed in enterprises born in year t}-5 \text{ and surviving to t}}{\text{number of persons employed in enterprises which are active in t}}$$

$$\text{mean Size of five}-\text{year}-\text{old Enterprises} = \frac{\text{number of persons employed in year t among enterprises born 5 years earlier}}{\text{number of enterprises in t born 5 years earlier(i. e., in year t}-5) \text{ that survived to t}}$$

Table 2. The average survival rate and its index in the 27 EU member states, 2008-17

	Countries	Average SR (%)	Average SRI (2008-2012)	Average SRI (2013-2017)
1	Austria	68.23	8.567	5.192
2	Belgium	81.89	10.000	6.997
3	Bulgaria	57.60	4.822	3.765
4	Croatia	64.56	-	5.220
5	Cyprus	63.39	6.464	4.921
6	Czech Republic	57.67	4.829	3.788
7	Denmark	51.32	3.619	2.155
8	Estonia	58.75	5.020	4.088
9	Finland	58.67	6.075	2.945
10	France	61.57	6.585	3.997
11	Germany	51.47	3.348	2.377
12	Hungary	51.71	3.205	2.597
13	Rep. of Ireland	73.44	6.954	10.000
14	Italy	59.15	6.208	3.283
15	Latvia	54.75	3.646	3.523
16	Lithuania	35.74	0.351	0.112
17	Luxembourg	68.49	7.781	5.950
18	Malta	96.51	-	8.141
19	Netherlands	65.68	6.314	5.967
20	Poland	54.90	4.580	2.817
21	Portugal	40.50	0.653	0.424
22	Romania	65.58	7.362	4.913
23	Slovakia	54.36	3.205	3.721
24	Slovenia	66.29	7.889	4.928
25	Spain	54.60	4.413	2.829
26	Sweden	76.06	9.781	7.516
27	United Kingdom	58.51	4.869	4.110
	Average		5.462	4.306

Source: See Table 1

Table 3 supplies the average SR and SE values for the whole period. The values of the former reveal that in 19 of the 27 EU member-states more that 2% of the people employed in the private sector were employed in enterprises that had commenced operation only five years earlier. (In Bulgaria, the figure exceeded 5% and in six other eastern EU member-states, namely, Croatia, Latvia, Lithuania, Poland, Romania, Slovakia, the figure was between 3% and 4%). Furthermore, avarage SE values reveal that in 12 out of 27 EU member-states, on average, five-year-old enterprises had about 3-6 employees. This suggests that, by and large, they were very small-sized (micro) businesses in terms of EU-28 standards (see Table 4).

Table 3. The employment share and size in terms of persons employed of five-year-old enterprises in the 27 EU member states, 2008-1

	Countries	Average ES (%)	Average SE (people)		Countries	Average ES (%)	Average SE (people)
1	Austria	1.82	3.20	15	Latvia	3.07	4.80
2	Belgium	2.17	2.51	16	Lithuania	3.22	5.39
3	Bulgaria	5.07	5.14	17	Luxembourg	1.89	4.35
4	Croatia	3.18	5.58	18	Malta	2.86	2.91
5	Cyprus	1.62	4.01	19	Netherlands	2.35	2.56
6	Czech Rep.	2.43	2.67	20	Poland	3.19	3.21
7	Denmark	1.66	2.52	21	Portugal	2.62	2.58
8	Estonia	2.42	2.96	22	Romania	3.85	5.12
9	Finland	1.36	1.90	23	Slovakia	3.49	3.02
10	France	2.26	2.81	24	Slovenia	2.16	2.33
11	Germany	1.20	3.00	25	Spain	2.32	2.45
12	Hungary	2.65	3.38	26	Sweden	1.70	1.88
13	Rep. of Ireland	1.74	2.74	27	United	2.32	4.52
14	Italy	2.20	2.53		Kingdom		

Source: See Table 1.

Table 4. Classification of businesses, EE-28

	Staff headcount and (a) Turnover or (b) Balance sheet total (in million euro)		
Micro	< 10	≤ 2	≤ 2
Small	< 50	≤ 10	≤ 10
Medium-sized	< 250	≤ 50	≤ 43
Large	≥ 250	> 50	> 43

Source: EU recommendation 2003/361(2003).

Section 3. Growth in the number of businesses and in GDP

We shift our attention to the study of growth patterns of business numbers and GDP across EU member-states as reported by Eurostat, by econometrically isolating autonomous (initial) components, time trends and notable medium-term (biennial or longer) fluctuations of the trends. To that end we employ a close variant of the well-established functional form described by Smith and Duncan (1944), Fox (1968), Franzini and Harvey (1983), Black (1992), Cameron (2005), Lee *et al.* (2019) and others:

$$y_{tc} = \beta_{0c} + \beta_{1c}\, t_i + \beta_{2c}\, t_i^2 + \sum_{i=0}^{3} \beta_{3ic}\, m_{itc}, \quad (3)$$

where 'y' stands for the regressand. Each equation is regressed via STATA 2013 separately, i.e., not as a system, and each regression involves annual data from all 28 EU member-states. 't' stands for time (t=1, …, 10) and enters the expression both as an index and as the long-run trend variable in each member-state. The trend may be linear; however, the inclusion of its square allows for the consideration of non-linear features (including a peak or a trough). 'c' stands for the number of member-states. 'm' is in binary form and stands for an exceptionally high medium-term deviation or fluctuation from the trend observed in a member-state. 'i's denote the number of these medium-term deviations in a member-state ($i \in [0,2]$ in the sense that ultimately, the maximum number of such fluctuations in any one state is two; however, in most states it is equal to 0). 'β's stand for the regressors' coefficients. Germany is set as reference, and in order to deal with heteroscedastic residuals both regressions are conducted with robust standard errors. The results are provided in Tables 5 and 6.

The former suggests that at the outset Lithuania (line 2), Estonia, Cyprus, Malta, the United Kingdom (line 3) featured the highest negative rates of change in the number of enterprises, while Greece (line 6) featured the highest positive rate. Subsequently (over time), rates:

- grew negative in Austria, the Netherlands, Poland (line 9), Bulgaria, Czech Republic, Romania, Slovenia, Sweden (line 10) and, probably, in Finland, France, Germany, Italy, Luxembourg, Slovakia (line 11; the p-values are quite modest);
- grew positive in Cyprus, Malta (line 13), Croatia, Denmark, Hungary and Spain (line 12);
- first decreased and then increased in Greece (lines 7 and 20, featuring a minimum in the 8-9 year), Belgium (lines 8 and 19, min 6-7 year), Portugal and the Republic of Ireland (lines 9 and 19, min 3-4 year), as per the twice differentiable function with respect to time (the estimated minima are provided in Table 7, column (2));
- first increased then decreased in Lithuania (lines 15-16, max 7-9 year), Latvia (lines 14 and 17, max 5-6 year), Estonia and the United Kingdom (lines 14 and 18, max 8-9 year).

In addition they featured large positive fluctuations from the trend in Lithuania during 2011-12 (line 23) and the Netherlands during 2015-16 (line 26), and large negative fluctuations from the trend in Romania during 2009-10 (line 21), Portugal during 2009-13 (line 22), the Czech Republic and Slovakia during 2012-13 (lines 24-25).

The findings of Table 6 suggest that at the outset Croatia, Estonia, Finland, Hungary, Italy, Latvia, Luxembourg, the Republic of Ireland, Slovenia (line 2) featured the highest negative GDP rates while Cyprus and Poland (line 6) featured the highest positive rates. Subsequently, the rates:

- grew positive in Luxembourg, Malta, the Republic of Ireland (line 12), Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovenia, the

United Kingdom (line 11), Bulgaria, Denmark, Finland, Italy, Sweden (line 10), Austria, Belgium, France, Netherlands (line 9), and, possibly, in Germany and Slovakia (line 8); probably grew negative in Spain (line 7);

- probably grew negative in Spain (line 7);
- first decreased and then increased in Cyprus, Greece (lines 5 and 14, min 4-5 year), Poland and Portugal (lines 6 and 13, min 4-5 year).

Table 5. The growth of the (net) number of businesses in the 28 EU member states, 2008-17

	Independent variables	coefficients	p-values
	Autonomous components		
1	Constant (Finland, Germany, Italy, Portugal, Rep. of Ireland serve as reference)	1.3102	0.1300
2	Lithuania	-30.7751	0.0000
3	Cyprus, Estonia, Malta, United Kingdom	-11.2811	0.0000
4	Croatia, Denmark, Hungary, Latvia, Spain	-4.8308	0.0000
5	Austria, Belgium, Bulgaria, Czech Republic, France, Luxembourg, Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden	4.5468	0.0000
6	Greece	53.6699	0.0000
	Time trend		
7	Greece	-13.6950	0.0000
8	Belgium	-1.3596	0.0000
9	Austria, Netherlands, Poland, Portugal, Rep. of Ireland	-0.7330	0.0000
10	Bulgaria, Czech Republic, Romania, Slovenia, Sweden	-0.4423	0.0000
11	Finland, France, Germany, Italy, Luxembourg, Slovakia	-0.1800	0.1920
12	Croatia, Denmark, Hungary, Spain	0.5317	0.0000
13	Cyprus, Malta	1.6619	0.0000
14	Estonia, Latvia, United Kingdom	3.5265	0.0000
15	Lithuania	10.6204	0.0000
	Time trend squared (to capture the rate of change)		
16	Lithuania	-0.7410	0.0000
17	Latvia	-0.3104	0.0000
18	Estonia, United Kingdom	-0.2151	0.0000
19	Belgium, Portugal, Rep. of Ireland	0.1070	0.0000
20	Greece	0.8250	0.0000
	Notable biennial or longer fluctuations		
21	Romania 2009-10	-10.9913	0.0000
22	Portugal 2009-13	-4.0952	0.0000
23	Lithuania 2011-12	8.6281	0.0000
24	Czech Republic 2012-13	-4.5045	0.0000
25	Slovakia 2012-13	-7.6221	0.0000
26	Netherlands 2015-16	4.1212	0.0000
	Observations	241	
	Model fitness (R^2)	46.45%	

Note: Regressions are estimated with robust standard errors so as to address issues of heterogeneity and lack of normality.

Source: See Table 1.

In addition, they featured large positive fluctuations from the trend in France, Finland and Sweden during 2010-11 (lines 18-19), Estonia during 2010-13 (line 20), Latvia during 2011-12 (line 21), and Greece during 2013-15 (line 25), and large negative fluctuations from the trend in the Republic of Ireland during 2008-09 and 2012-13 (lines 15 and 22), Latvia and Romania during 2009-10 (lines 16-17), the Czech Republic during 2012-13 (line 23), Cyprus during 2012-14 (line 24), Luxemburg, Malta, and the United Kingdom during 2016-17 (lines 26-28).

Table 6. The growth of real GDP in the 28 EU member states, 2008-17

	Independent variables	coefficients	p-values
	Autonomous effects		
1	Constant (Austria, Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Greece, Lithuania, Malta, Netherlands, Romania, Spain, Sweden, United Kingdom serve as reference)	-1.3285	0.0340
2	Croatia, Estonia, Finland, Hungary, Italy, Latvia, Luxembourg, Rep. of Ireland, Slovenia	-1.9125	0.0000
3	Portugal, Slovakia	2.9315	0.0030
4	Cyprus, Poland	6.0809	0.0000
	Time trend		
5	Cyprus, Greece	-2.2613	0.0000
6	Poland, Portugal	-1.0312	0.0060
7	Spain	-0.5172	0.1100
8	Germany, Slovakia	0.1133	0.3110
9	Austria, Belgium, France, Netherlands	0.3668	0.0000
10	Bulgaria, Denmark, Finland, Italy, Sweden	0.4719	0.0000
11	Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovenia, United Kingdom	0.6674	0.0000
12	Luxembourg, Malta, Rep. of Ireland	1.3507	0.0000
	Time trend squared (to capture the rate of change)		
13	Poland, Portugal, Spain	0.1110	0.0010
14	Cyprus, Greece	0.2512	0.0000
	Notable biennial or longer fluctuations		
15	Rep. of Ireland 2008-09	-3.5849	0.0000
16	Latvia 2009-10	-7.7775	0.0230
17	Romania 2009-10	-5.0400	0.0000
18	France 2010-11	2.0949	0.0000
19	Finland, Sweden 2010-11	4.3832	0.0000
20	Estonia 2010-13	4.9714	0.0000
21	Latvia 2011-12	5.4377	0.0000
22	Rep. of Ireland 2012-13	-3.3876	0.0100
23	Czech Republic 2012-13	-2.9923	0.0000

24	Cyprus 2012-14	-4.3606	0.0010
25	Greece 2013-15	3.7165	0.0010
26	Luxembourg 2016-17	-6.3903	0.0200
27	Malta 2016-17	-5.3528	0.0150
28	United Kingdom 2016-17	-3.1119	0.0000
	Observations	279	
	Model fitness (R^2)	52.59%	

Note and Source: See Table 5.

Section 4. Conclusions

It turns out that during 2008-17, in 17 of the 28 EU states (Bulgaria, Croatia, the Czech Republic, Denmark, Hungary, Lithuania, Malta, Romania, Sweden, Slovenia, Finland, France, Germany, Italy, Luxembourg, Slovakia, Portugal) the long-term trends of the two measures were similar. Understandably, the GDP is also affected by other factors (esp. in the other member-states). In two of the 17 states and in two of the other states more than 70% of new businesses survived three years later, and in four of the former and three of the latter, businesses born five years earlier employed more than 3% of all employees in the private sector. In all states, by and large, new companies employed a small number of staff throughout this period. If the practices and policies employed in type A countries, esp. the Rep. of Ireland, and Belgium-Sweden in the first half of the period, and Malta-Slovakia in the second half of the period, were employed by the rest, perhaps even more businesses might have survived.

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