

Fedotenkov, Igor; Vandeplass, Anneleen

Working Paper

The implications of ageing for business dynamics

LICOS Discussion Paper, No. 428

Provided in Cooperation with:

LICOS Centre for Institutions and Economic Performance, KU Leuven

Suggested Citation: Fedotenkov, Igor; Vandeplass, Anneleen (2021) : The implications of ageing for business dynamics, LICOS Discussion Paper, No. 428, Katholieke Universiteit Leuven, LICOS Centre for Institutions and Economic Performance, Leuven

This Version is available at:

<https://hdl.handle.net/10419/267924>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



LICOS Centre for Institutions and Economic Performance

Centre of Excellence

LICOS Discussion Paper Series

Discussion Paper 428/2021

The Implications of Ageing for Business Dynamics

Igor Fedotenkov and Anneleen Vandeplas

KU LEUVEN

Faculty of Economics and Business

LICOS Centre for Institutions and Economic Performance

Waaistraat 6 – mailbox 3511

3000 Leuven

BELGIUM

TEL: +32-(0)16 32 65 98

<http://www.econ.kuleuven.be/licos>



The implications of ageing for business dynamics

Igor Fedotenkov¹ and Anneleen Vandeplass²

December 14, 2021

Abstract

This paper studies the link between the demographic structure of populations and firm entry rates in the European Union. We find that firm entry rates have a hump-shaped relationship with human demography, with the 40-54 age group having the strongest positive impact on firm entry. Potential mechanisms through which this relationship may arise include labour market participation, demand and access to entrepreneurship (linked with experience and access to finance). Perhaps more surprisingly, firm entry again picks up with generations aged 80 and over expanding. This could relate to the fact that a larger 80+ age cohort reflects greater longevity, which in turn increases savings, reduces interest rates and therefore increases availability of external financing. When controlling for life expectancy and interest rates, the coefficient corresponding to the 80+ age cohort sharply declines and becomes insignificant. Based on the results of the analysis, we assess the implications of our results for firm entry rates by 2025 and 2030, using UN population projections.

JEL classification: D22, J11, J15, L29, M13

Keywords: Firm entry rates, demographic structure, longevity

¹ Corresponding author, European Commission, JRC B7. i.fedotenkov@gmail.com, +32487665834, Rue du Champ de Mars, 21, 1050 Brussels – Belgium. ORCID 0000-0003-3344-4401.

² European Commission and LICOS – Centre for Institutions and Economic Performance, KU Leuven. ORCID 0000-0001-7629-578X.

1. Introduction

Business dynamism provides a signal regarding the health of an economy. It is a benchmark for the ease of reallocation of resources from low-productivity to high-productivity activities, and for how well the process of “creative destruction” works, through which old and less productive firms are destroyed, freeing up resources for the creation of new and innovative firms (Schumpeter 1942). Young firms tend to be more dynamic, have a higher likelihood to grow fast, and are found to contribute more than proportionally to aggregate employment growth – even if they are also likely to exit the market at a higher rate (Geroski 1995, Bravo-Biosca et al. 2013). More generally, the demography of firms has been shown to have a bearing on employment (Fritsch 1997, Kritikos 2014), innovation and the dissemination of new technologies (Brandt 2005; Geroski 1995), productivity (Anderton et al. 2020; Geroski 1995), and economic growth (Dejardin 2011).

The topic of business dynamics has recently regained research interest as some have pointed at the long-term decline in the entry rate of firms and in the share of young firms in economic activity in some advanced countries, with potentially important implications for productivity growth (Akcigit and Ates 2019; Decker et al. 2016; Bijmens and Konings, 2020).

While the differences in business dynamics across countries and across time have by now been extensively documented, there remain substantial unclarities regarding what is driving these differences (Bravo-Biosca et al. 2013). The literature has identified several policy-related factors that are likely to play a role, such as the quality of institutions, access to finance, access to human capital, and regulatory rigidities. These will be discussed in more detail in Section 2. Pinning down the precise contributions of each of these factors to observed business dynamics nevertheless remains challenging, possibly owing partially to data availability and measurement problems.

This paper looks at the impact of another factor which is not directly under the influence of policymakers, but is an important global phenomenon which will affect many advanced economies in the coming decades, with important socio-economic repercussions, notably ageing. Even if policymakers can do little about ageing in the short run, a better understanding of how ageing will impact our economies and societies can help them anticipate possible challenges and reflect on how to best address them. Research on the link between demography and business dynamics is emerging. It generally finds that ageing has contributed to the decline in business dynamism in the United States. Studies that examine whether similar results apply to Europe are lacking.

The paper examines the link at the macro-level between demographic structure and firm entry through a longitudinal analysis covering 25 countries in Europe. Firm entry is a standard measure of business dynamism.³ The results of the analysis are then used to estimate the implications of Europe’s changing demographic structure on firm entry rates by 2025 and 2030. An important caveat is that these forecasts reflect only the effects of demographic developments, which are likely to be dwarfed by other economic and policy repercussions emanating from the pandemic and other ongoing trends.

³ Others include firm exit, or the churn rate (the sum of birth and death), the share of young firms, or the rate of high-growth enterprises. See for more details OECD (2017).

2. Literature review

The factors most often considered among the drivers of business dynamics are economic factors (such as cost advantages of incumbents, expectations about post-entry competition, the importance of sunk costs, network and broader scale economies, learning effects, and opportunities for product differentiation) as well as institutional and regulatory factors (such as the administrative burden, insolvency frameworks, product and labour market regulations, taxation, intellectual property rights protection). Access to production factors such as finance and intangible assets (human capital, R&D policies, ICT infrastructure), the political environment and entrepreneurship culture are also likely to play a role.

A key factor influencing firm entry rates is the quality of institutions. Better protection of property rights and a lower incidence of corruption increase rates of firm entry, decrease rates of exit, and reduce average firm size (Desai et al. 2003). The importance of institutional quality for firm entry rates, and corruption in particular, is also highlighted by Aidis et al. (2012). Djankov et al. (2002) find that in most countries, the administrative burden on entrepreneurs to start a business is quite high, and risks putting a damper on firm entry. They compiled a dataset that has sparked a rich literature on the link between entry regulation, entry rates and productivity growth (Djankov et al., 2009). Kaplan et al. (2011) provide evidence that a reduction on regulation had a tangible positive impact on the rate of start-ups. Campos & Iooty (2007) found that institutional barriers in a broad sense (such as labour regulations, tax regulations, contract enforcement, the quality of the judiciary system and corruption) matter more for firm entry than for their operation and growth. The role of regulatory entry restrictions has also been emphasized by Bhaumik et al. (2007) and Klapper et al. (2006). Bruno et al. (2013) report evidence that political stability contributes to firm entry.

Easier access to finance stimulates firms' birth rates, their growth if successful, and their exit if competition in the market becomes too harsh (Aghion et al. 2007). In markets with low bank competition, potential entrants face greater difficulty gaining access to credit than in the markets in which banking is less concentrated (Cetorelli & Strahan 2006). A study by Baptista et al. (2011) lends support to the hypothesis that access to knowledge and intangible assets (through the establishment of a new university) increases knowledge-based firm entry while reducing entry in other sectors such as low-tech manufacturing.

Existing research has investigated the role of age as a determinant of entrepreneurship. It tends to find a hump-shaped relationship between the age of individual entrepreneurs and the likelihood of starting a business, which peaks around the age of 40-45 (Mondragón-Velez 2009; Kautonen et al. 2014). Diverse reasons have been put forward to explain the non-linear effect of age on entrepreneurship. On the one hand, individuals' willingness to engage in risky enterprise may decline with age, as they have less time left to reap the potential benefits of a career change and need to secure their savings for retirement. Moreover, their wage rate as an employee increases over time with work experience (Lévesque & Minniti 2006). Young people may be more familiar with new technologies and innovations. Certain types of intelligence peak between the age of 20 and 40 and young people may be less distracted by family responsibilities (Hartshorne & Germine 2015; Azouley et al. 2020). On the other hand, work experience and the associated human capital accumulation (e.g. in terms of management skills, customer needs, regulatory constraints, strategic

opportunities...) as well as better access to social and financial capital is likely to raise more mature entrepreneurs' expected returns from starting a business (Cressy 1996; Cabral & Mata 2003; Brown et al. 2019; Azoulay et al. 2020).

A newly emerging literature is studying the nexus between demographic change and business dynamics at a more aggregate level. US data that span the 1978-2016 period lend support to Engbom (2019)'s hypothesis that an older population reduces firm entry, as older workers generally have better jobs and are less likely to give them up to start their own business. This effect is reinforced by the fact that the ageing of potential recruits raises the cost of hiring, further reducing the appeal of starting a new firm and increasing the appeal of remaining an employee. Drawing on a theoretical model that predicts a hump-shaped relationship between age and entrepreneurship, Kopecky (2019) finds that demographic trends can explain a large proportion of the decline in business dynamism in the US since 2000. Liang et al. (2018) hypothesize that in an ageing population, older workers occupy management positions and hamper young workers from developing the skills needed to set up a business. This hypothesis is able to explain why observed entrepreneurship rates in ageing countries are lower across all age groups, such that the lower aggregate entrepreneurship rate is not simply the result of a composition effect. A related study based on US micro-data by Hopenhayn et al. (2018) finds that slower population growth, which is often associated with ageing, drags down firm entry by reducing the availability of labour. Bornstein (2018) sets out that an ageing population increases consumer inertia, reducing opportunities for new markets to develop and therefore firm entry. Evidence on Europe remains sparse.

Finally, a related strand of literature has examined other impacts of ageing on the aggregate economy. Data from the European Labour Force Survey suggest that employment rates peak in the age group 40-50. Some studies argue that productivity also peaks mid-life (e.g. Feyrer, 2007), even if the evidence remains mixed. There are some indications that the age-productivity relationship is highly context-specific, and that it depends for instance on the considered sector, with productivity in the manufacturing sector peaking at an earlier age than in knowledge-intensive sectors such as the IT sector (Benkovskis & Tkacevs 2019; Amidei et al., 2019; Mahlberg et al., 2013; Göbel & Zwick, 2012; Lallemand & Rycx, 2009). At the same time, a study by Börsch-Supan and Weiss (2016) warns for spurious negative correlation between productivity and age as more productive and profitable firms are more likely to hire new recruits and rejuvenate their workforce. Using micro-level data from a German car manufacturing plant they find a monotonic increase in productivity with worker age.

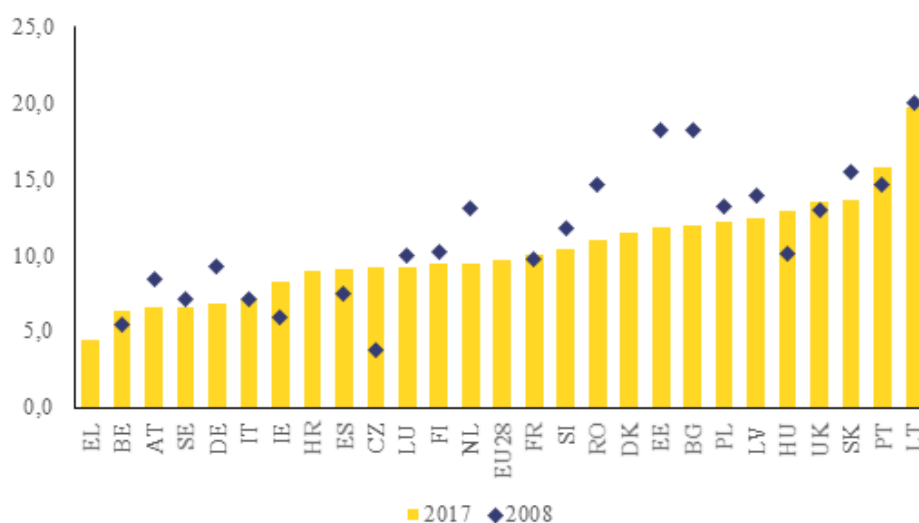
3. Data and methodology

We examine the relationship between demographic trends and firm entry rates drawing on a longitudinal country-level dataset. The dataset covers 25 countries of the European Union (apart

from Malta and Cyprus, due to data limitations) and the UK (26 countries in total) and spans the period 2008-2017.⁴

Data on firm entry rates are obtained from the Firm Demography database within the Structural Business Statistics (SBS) of Eurostat. The firm entry rate is defined as the number of enterprise births in the reference period (t) divided by the number of enterprises active in t (percent), including enterprises born in the reference period. Figure 1 shows firm birth rates across EU countries in 2008 and 2017. Overall, Eastern-European countries are more likely to have relatively high firm entry rates. These countries have also been growing faster over the considered period than other countries. Northern countries are more likely to have lower firm birth rates, except for Denmark and United Kingdom. The dynamics of firm entry rates over the analyzed period in selected countries are presented in more detail in Figure 5 in Appendix B. In Austria, Bulgaria, Estonia, Germany, Netherlands and Slovenia, entry rates slowly decline over time. In Hungary, Ireland, Portugal, and Spain they slowly increase. In other countries, in some periods entry rates were declining and in other periods they increased.

Figure 1: Firm entry rates across the EU, 2008 and 2017



Source: Eurostat, Structural Business Statistics

Note: The firm entry or birth rate is calculated as the number of enterprise births in the reference period (t) divided by the number of enterprises active in t - percentage. The data cover the business economy except activities of holding companies

The data on demographic structure (number of agents of a specific age) were obtained from the World Bank Development Indicators. Data are available for 17 cohorts 0-4, 5-9, 10-14, ..., 85-79, 80+ (year-old). The analysis uses relative cohort sizes, calculated as the share of the 5-year age cohort in the total population. A similar methodology is used, for example, by Lindh and Malmberg (1998) and by Feyrer (2007; 2008). One cohort needs to be excluded from the analysis in order to

⁴ Our dataset also includes only 3 observations for Greece (2015-2017). These are nevertheless included in the analysis.

avoid “less-than-full-rank” multicollinearity. However, even after the exclusion of one cohort, the sizes of adjacent cohorts are highly correlated with each other. For example, the size of cohort 0-4 is highly correlated with the size of 5-9 cohort (correlation = 0.7848). VIF tests for a few coefficients of the models provide values exceeding 10, the rule-of-thumb critical value in multicollinearity testing. Multicollinearity gives rise to unstable regression results. In order to address this problem, instead of using one (0-4) cohort as a reference group, we merge three cohorts together and consider all 0-14 year-old children as a reference group. This increases the stability of our estimates considerably. The use of broader age intervals (10-year age cohorts) further reduces correlation between cohort sizes, but it also reduces the variation in the cohort sizes and raises the variance of estimates. Nevertheless, the main results remain similar. Models with 10-years intervals are presented in the Appendix C. As an additional robustness check, we approximate the age profile with polynomials. Our results remain stable, suggesting that they are not distorted by multicollinearity.

Apart from cohort sizes, we control for the percentage of immigrants in the population, population growth, and life expectancy at birth, in a few models. Population growth and life expectancy also come from the World Bank Development Indicators. The percentage of immigrants in the population is calculated by the authors from Eurostat data on the number of individuals residing in a country that were born abroad. It includes individuals originating from other European countries.⁵

We also use a few factors that reflect the quality of institutions as control variables, as these may affect firms’ entry rates. The data on control of corruption come from the Worldwide Governance indicators.⁶ The variables take on values in the interval [-2.5, 2.5]; higher values correspond to better institutions. We also use a property rights index, which is a component of the Index of Economic Freedom,⁷ and data on the cost of starting a business, one of the World Bank’s Doing Business indicators.⁸ We prefer to use these subcomponents because the aggregate indexes are subject to numerous methodological changes, resulting in structural breaks.

In one regression, we controlled in addition for lending interest rates. Lending interest rates come from the IMF database. An important complication is that the definition of interest rates in the countries constituting the European Monetary Union (EMU) differs from those outside of EMU in the IMF database. In EMU, interest rates are defined as interest rates provided for “new businesses, households, consumption”, while the description of interest rates outside EMU is “financial interest rates, lending rate”, with no specification of the purpose of the loans. Therefore, they also include interest rates of loans provided to established firms. Nevertheless, the problem of different definitions of interest rates is mitigated by an inclusion of country-specific fixed effects into the regression model.

⁵ Eurostat variable *migr_pop3ctb*

⁶ A research dataset on governance indicators compiled by the World Bank, and covers 200 countries and territories over the period 1996–2019. See <https://info.worldbank.org/governance/wgi/> for more details..

⁷ The Index of Economic Freedom is an annual index created in 1995 by the Heritage Foundation and the Wall Street Journal. It covers 184 countries. See <https://www.heritage.org/index/> for more details. for more details.

⁸ The Doing Business project is led by the World Bank and provides objective measures of business regulations and their enforcement across 190 economies. See <https://www.doingbusiness.org/> for more details. for more details.

Our data constitute an unbalanced panel. All models include country- and time-specific fixed effects. Country-specific fixed effects allow us to solve many endogeneity problems resulting from time-invariant country-level variation (Mundlak 1978). Time-fixed effects control for common shocks, such as the periods of economic crises and global economic trends. A standard “within” estimator is employed.

4. Results

Estimates are presented in Table 1. Furthermore, the effects of cohorts in models 1-4 are visualized in Figure 2. In the first model, firm entry rates are regressed on the sizes of cohorts. In the second model, we control for the number of migrants and population growth. In the third model, we control for the property right index and for the costs of starting a business. In model 4, we include a variable measuring the control of corruption. The Breusch-Godfrey test for serial correlation (Breusch 1978, Godfrey 1978) rejects the null hypothesis of no serial correlation in the first model at the 10% significance level (p-value=0.086). Therefore, we present correlation-robust standard errors of the Arellano type (Arellano 1987). In the other models, we present ordinary standard errors, because Breusch-Godfrey test does not reject the null hypothesis at the 10% significance level. The low R^2 and R^2 -adjusted values in our models relate to our use of R’s *plm* package for the estimation, which is known for underestimating the coefficients of determination.⁹

Generations 0-14 are used as a baseline category. The effect of the size of cohort 15-19 is positive and statistically significant at 5%-10% significance levels, depending on the model specification. In the EU, many children of this age are still continuing their studies. Nevertheless, this generation can already supply some labour (even if on the weekends or during holidays), and often at a cheaper rate than adults.¹⁰ It could as well be that, in comparison to 0-14-year children, 15-19-old children are more independent and do not require as much attention, leaving more space to their parents to dedicate time to work and business.

Table 1: Results of the fixed effects panel data regression (dep. variable: firm entry rate)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Gen 15-19	1.2003* (0.6207)	1.6707** (0.7039)	1.6046** (0.7087)	1.6400** (0.7198)	1.6424** (0.7264)	2.6256** (1.3174)
Gen 20-24	0.8163 (0.5431)	1.6871*** (0.6035)	1.6796*** (0.6065)	1.6863*** (0.6087)	1.6879*** (0.6130)	1.8286** (0.8674)
Gen 25-29	0.0421 (0.6211)	0.7556 (0.8010)	0.8730 (0.8082)	0.8636 (0.8112)	0.8665 (0.8193)	1.8168 (1.3409)
Gen 30-34	0.6459 (0.6954)	2.3059*** (0.8529)	2.4841*** (0.8683)	2.4427*** (0.8810)	2.4460*** (0.8908)	2.3253* (1.3206)

⁹ More information on the R^2 calculation in R’s *plm* package is available at: <https://stats.stackexchange.com/questions/117912/wrong-reported-total-sum-of-squares-in-time-fixed-effects-with-plm-twoways>; <http://karthur.org/2016/fixed-effects-panel-models-in-r.html> ;

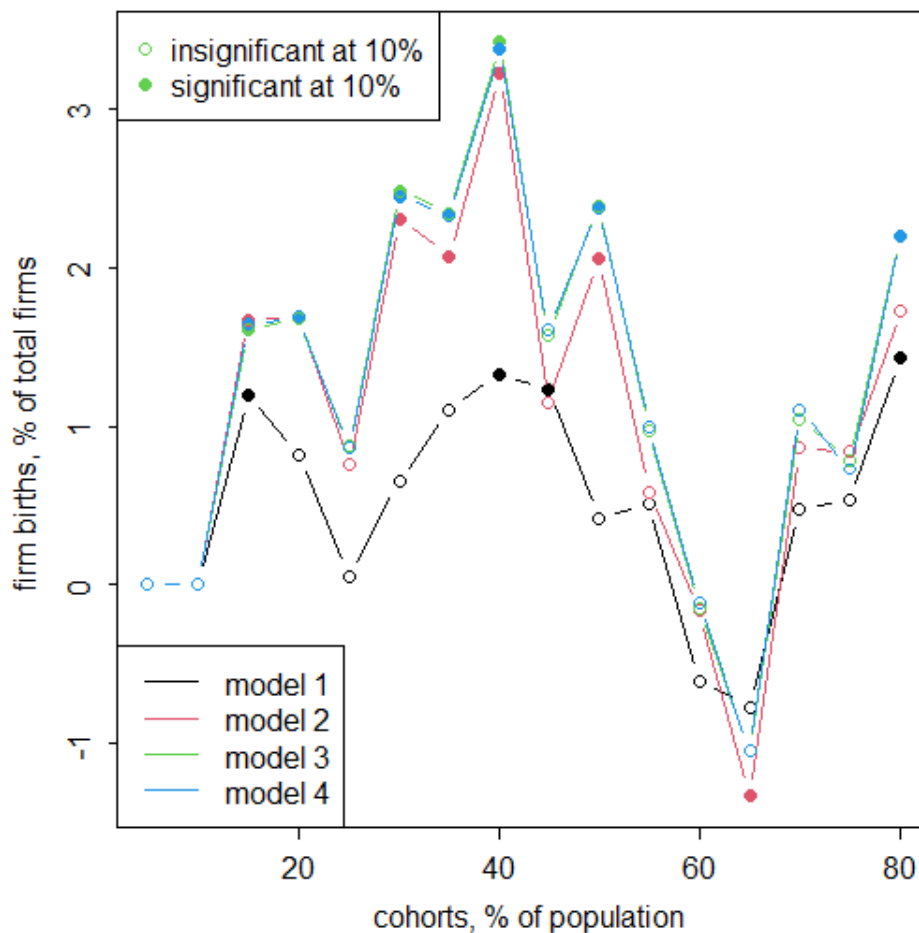
¹⁰ Some Member States apply subminimum wage rates to youngsters; other Member States apply specific conditions (e.g. reduced social security contribution rates) to student jobs.

Gen 35-39	1.1070 (0.8316)	2.0657** (0.9910)	2.3417** (1.0264)	2.3257** (1.0306)	2.3283** (1.0375)	2.7395 (1.6670)
Gen 40-44	1.3293* (0.6810)	3.220*** (0.8157)	3.4156*** (0.8337)	3.3761*** (0.8457)	3.3842*** (0.8904)	4.1362*** (1.2484)
Gen 45-49	1.2312* (0.7101)	1.1455 (0.8916)	1.5763 (1.1535)	1.6035 (0.9809)	1.6017 (0.9858)	0.7099 (1.5270)
Gen 50-54	0.4119 (0.9946)	2.0560* (1.1160)	2.3867** (1.1535)	2.3727** (1.1577)	2.3737** (1.1620)	4.4207** (1.7195)
Gen 55-59	0.5007 (0.6071)	0.5761 (0.7234)	0.9769 (0.8100)	0.9997 (0.8156)	1.0002 (0.8185)	0.5534 (1.2346)
Gen 60-64	-0.6140 (0.5742)	-0.1745 (0.7341)	-0.1542 (0.7410)	-0.1216 (0.7505)	-0.1208 (0.7534)	0.6859 (1.1949)
Gen 65-69	-0.7771 (0.5973)	-1.3393* (0.7774)	-1.0553 (0.8145)	-1.0490 (0.8171)	-1.0497 (0.8200)	-0.1488 (1.2651)
Gen 70-74	0.4659 (0.6723)	0.8636 (0.7431)	1.0457 (0.7597)	1.1011 (0.7824)	1.1040 (0.7909)	1.4496 (1.1551)
Gen 75-79	0.5254 (0.8708)	0.8395 (0.8965)	0.7830 (0.8993)	0.7262 (0.9201)	0.7325 (0.9461)	0.3612 (1.2639)
Gen 80+	1.4362* (0.8213)	1.7084 (1.0458)	2.2001* (1.1368)	2.1922* (1.1404)	2.2030* (1.1997)	1.5192 (1.5527)
Migrants (%)		-0.2575* (0.1503)	-0.2618* (0.1508)	-0.2663* (0.1519)	-0.2664* (0.1541)	-0.3951 (0.3872)
Population growth		-0.4208 (0.4230)	-0.4827 (0.4268)	-0.4916 (0.4290)	-0.4927 (0.4319)	-0.5733 (0.5153)
Property right index			-0.0209 (0.0240)	-0.0233 (0.0253)	-0.0233 (0.0255)	-0.0417 (0.0347)
Cost starting business			0.1060 (0.1079)	0.1079 (0.1084)	0.1080 (0.1087)	0.2029 (0.1798)
Control of corruption				0.4120 (1.3228)	0.4093 (1.3303)	0.4730 (1.7821)
Life expectancy					-0.0150 (0.5020)	0.5450 (0.7303)
Lending interest rate						-0.9363 (0.1047)
R ²	0.1361	0.2055	0.2128	0.2133	0.2133	0.2606
R ² -adj	-0.0788	-0.0369	-0.0395	-0.0455	-0.0523	-0.0628
N	237	207	207	207	207	162
df	189	158	156	155	154	112

In general, the effects of cohorts below 70 years-old have a 'hump shaped' profile, reaching a maximum around 40-44 years. This could mean that individuals of age 40-44 have better access to knowledge (through experience) and financial capital to start their own business. In addition, through the accumulated human capital, they may be valuable workers for newly-created firms.

After the age of 55, the profiles decline sharply, the estimates of the effects of generations 60-64 being negative. In most cases, apart from model 2, these negative effects are insignificant at the 10% level. This indicates that the effects of the generation 60-64 on firm entry rates do not significantly differ from 0-14-years-old children, despite people of such age having accumulated more human capital and financial assets, which are needed to start a business. This result is in line with the findings of Engbom (2019), who argued that older people are less likely to attempt entrepreneurship and switch employers because they often have better jobs and less to gain from starting a new professional adventure.¹¹

Figure 2: Cohort effects on firms' entry rate (models 1-4, estimated coefficients)



Interestingly, the effect of the size of age cohort 80+ on firm entry rates is positive and statistically significant in most models. This is a finding that has not been documented in the literature before. Various explanations can be thought of.

¹¹ At the same time, individuals who lose their job in this age group and are not ready to retire yet, tend to face more persistent unemployment rates (Neumark & Yen 2020). For some, this may be a reason to start their own business. For a more extensive review of international evidence on the determinants of entrepreneurship among older workers, see Fonseca & Parker (2019).

A first possible explanation of the positive effect of the 80+ cohort size on firm entry rates relates to *market creation*. In contrast with Bornstein (2018)'s view that ageing consumers present a more inert market, some have argued that at the current juncture, the 'silver economy' is set to be the strongest growing market segment. Dobbs et al. (2016) argue that the 60+ age group in the United States, Western Europe, and Northeast Asia will generate more than one-third of global consumption growth over the 2015-2030 period – while European millennials would contribute less than 2% (see also, for instance, Patterson et al. (2017) on the tourism industry). Several newspapers recently reported that the “baby boomer” generation is the hottest market for start-ups (e.g. Gustke 2016, Thomas & Roy 2016). However, if we control for longevity (model 5), the effect of the 80+ cohort remains statistically significant at the 10% significance level.

A second possible explanation for the positive impact of the 80+ cohort size on entrepreneurship works through the channel of easing access to capital. Several theoretical models have predicted a positive link between a longer life expectancy and the ensuing population ageing on the one hand, and larger savings and therefore capital deepening on the other hand (see e.g. Zhang & Zhang 2005, Adema et al 2008).¹² The link between life expectancy and savings has also been confirmed empirically (Bloom 2008, De Nardi 2008, Kinugasa & Mason 2007). Moreover, as elderly people tend to take out fewer loans, an ageing population is likely to reduce the demand for loans.¹³ This intensifies bank competition for credit takers, leading to easier access to finance. In order to verify this hypothesis, we include interest rates of loans into model 6. If we do so, the value of the coefficient corresponding to generation 80+ declines substantially and becomes statistically insignificant, which means that the results are consistent with our hypothesis.

The impact of the proportion of migrants has a negative impact on firm entry. This is somewhat at odds with other literature arguing that immigrants tend to create new markets (as producers or as consumers), which one would expect to raise firm entry (Bettin et al. 2019). Moreover, immigrants also tend to have more difficulties to find a job as a result of language barriers and/or discrimination, which would again lead us to expect a higher rate of self-employment among immigrants. On the other hand, immigrants may suffer from lower access to social and financial capital. They are also, on average, less-qualified than native workers in most European countries. It is possible that the impact of immigrants on firm entry is somewhat intertwined with the impact of the 20-40 age group, as this is the most common age at which people move to other countries.

Population growth has an unexpected negative sign; however, it is statistically insignificant in all the models. All institutional variables we controlled for remained insignificant.

We also carried out a robustness test, combining all individuals of 65 years and over into one cohort, 65+. Table 2 presents these estimates.

Some have argued that ageing would have a negative impact on savings rates (as retired persons are likely to draw down their savings); others have rejected this idea based on the notion that prime age individuals who anticipate a higher need for savings during retirement, due to a longer life expectancy, will increase their savings rates. Our analysis is consistent with the latter idea.

¹³ See e.g. Fedotenkov (2018) for a distribution of total credit volumes by age in Lithuania

Table 2: Robustness check: results of the fixed effects panel data regression, single 65+ cohort (dep. variable: firm entry rate)

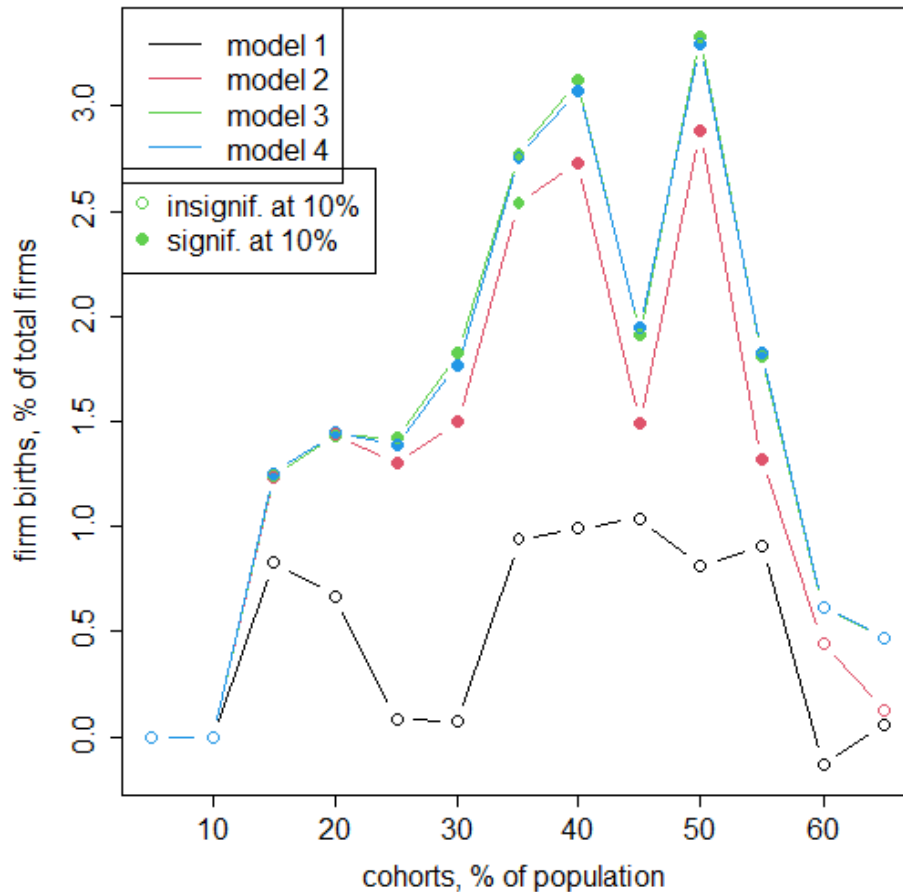
	Model 1, 65+	Model 2, 65+	Model 3, 65+	Model 4, 65+
Gen 15-19	0.8261 (0.6126)	1.2341* (0.6597)	1.2379* (0.6603)	1.2503* (0.6633)
Gen 20-24	0.6649 (0.4491)	1.4409** (0.6048)	1.4378** (0.6041)	1.4527** (0.6076)
Gen 25-29	0.8809 (0.6667)	1.2948* (0.7651)	1.4229* (0.7678)	1.3901* (0.7767)
Gen 30-34	0.763 (0.6727)	1.5053* (0.8103)	1.8285** (0.8308)	1.7706** (0.8523)
Gen 35-39	0.9352 (0.7775)	2.5377** (0.9961)	2.7737*** (1.0143)	2.7537** (1.0190)
Gen 40-44	0.9922 (0.6670)	2.7300*** (0.7971)	3.1172*** (0.8296)	3.0697** (0.8448)
Gen 45-49	1.0320 (0.7128)	1.4923* (0.8936)	1.9127** (0.9424)	1.9450** (0.9504)
Gen 50-54	0.8085 (0.8560)	2.8786*** (1.0769)	3.3227*** (1.1050)	3.2892*** (1.1130)
Gen 55-59	0.9015 (0.5696)	1.3126** (0.6618)	1.8129** (0.7578)	1.8277** (0.7613)
Gen 60-64	-0.1335 (0.5583)	0.4472 (0.5735)	0.6157 (0.5803)	0.6175 (0.5820)
Gen 65+	0.0602 (0.5243)	0.1256 (0.5659)	0.4654 (0.6007)	0.4722 (0.6028)
Migrants (%)		-0.3109** (0.1442)	-0.3097** (0.1439)	-0.3086** (0.1443)
Population growth		-0.1510 (0.3655)	-0.3816 (0.3902)	-0.4049 (0.3979)
Property right index			-0.0312 (0.0233)	-0.0333 (0.0243)
Costs, starting business			0.1170 (0.0994)	0.1183 (0.0998)
Control of corruption				0.4042 (1.2536)
R ²	0.1178	0.16021	0.1753	0.1759
R ² -adj	-0.0844	-0.0745	-0.0685	-0.0745
N	237	207	207	207
DF	192	161	159	158

On the one hand, merging cohorts into broader age intervals increases the number of degrees of freedom of the regression. On the other hand, the lower number of regressors increases the variance

of the residuals. As a result, in comparison to estimates presented in Table 1, the coefficients of model 1 are less significant, while those of models 2-4 become more significant in Table 2. The negative and the insignificant effect of generation 65-70 seems to cancel out the positive and statistically significant effect of generation 80+. But in addition, most other estimates corresponding to demographic variables are lower than those presented in Table 1 as well. The estimates are presented graphically in Figure 3.

For models 2-4, the effect of subsequent cohort sizes broadly increases until the cohort 40-44. Then there is a small decline for the 45-49 cohort. Nevertheless, the coefficient that measures the effect of the 45-49 cohort size remains within two standard errors of the coefficients measuring the impact of the preceding and the subsequent cohorts. For the age cohort 50-54, the effect size again reaches a peak, after which a monotonic decline is observed.

Figure 3: The effects of different cohort sizes on firm entry rates (single 65+ cohort)



Our results may to some extent be affected by endogeneity problems. As a matter of fact, cohort sizes may be influenced by economic factors which also affect firm entry rates. Cohort sizes may be affected via fertility, mortality and migration rates. First, fertility has been found to be respond pro-cyclically to changes in economic activity, like firm entry rates. High unemployment reduces fertility (Bellido & Marcén 2019). This could mean that larger birth cohort sizes are associated with higher firm entry rates. As the birth cohort is included in the baseline category of our model,

this would induce a downward bias in the coefficients on all the other cohort sizes. But it should not change the relative coefficient sizes, i.e. the overall ‘hump-shaped’ profile.

The impact of business cycles on mortality remains highly debated. Some have found mortality to be inversely linked to economic outcomes, especially for individuals in younger age groups (< 65), as mortality in these groups is often due to preventable causes (Duleep 1986; Anson 1988). Others have found mortality, and more broadly morbidity, to be increasing with economic activity, as it brings along more traffic, worse diets, less exercise, and more workplace stress and accidents (Ruhm 2000). Still others find the pro-cyclicality of mortality depends on a country’s institutional characteristics (e.g. the strength of the welfare system) and on the age group considered (Haaland & Telle 2015). A correlation between economic activity and mortality could in principle induce a bias in the cohort size effects. However, as controlling for longevity does not affect our results significantly, this bias does not seem to drive our results.

Immigration has also often been found to be pro-cyclical, in particular in the case of labour migration, which typically concerns younger age groups (aged 20-40) (Saks & Wozniak 2011; Huart & Tchakpalla 2019). Therefore, both an increase in firm births and an increase in the size of young cohorts may be caused by better economic conditions. As a result, the coefficients corresponding to younger cohorts could be overestimated. To avoid this bias, we have controlled for immigration in most of our regression models. Moreover, as a robustness check, we controlled for factors such as GDP growth and unemployment.¹⁴ The main conclusions remained unchanged.

5. Robustness checks

In Appendix C, we present further robustness checks using 10-year cohort intervals. Again, the effects of cohorts younger than 70 have a “hump-shaped” profile, reaching a peak for age group 40-49 years. The effects of cohort 80+ are statistically significant in most models at the 5% - 10% significance level. Institutional variables remain mostly insignificant.

An additional robustness test makes the assumption that model parameters corresponding to cohort effects can be approximated by a polynomial. Such a methodology was recently used by Juselius & Takáts (2021) for studying effects of cohort sizes on inflation.¹⁵ In this case, we assume that coefficients corresponding to cohorts β_i can be approximated by a polynomial: $\beta_i = \gamma_0 + \gamma_1 k + \dots + \gamma_r k^r$, where $k = 1, \dots, 14$ is an integer indicating the cohort, and r is the order of the polynomial. In this case, instead of estimating parameters β_i it is sufficient to estimate parameters $\gamma_j, j = 0, \dots, r$. Such an approach allows reducing the number of estimated parameters and getting rid of all possible multicollinearity problems.

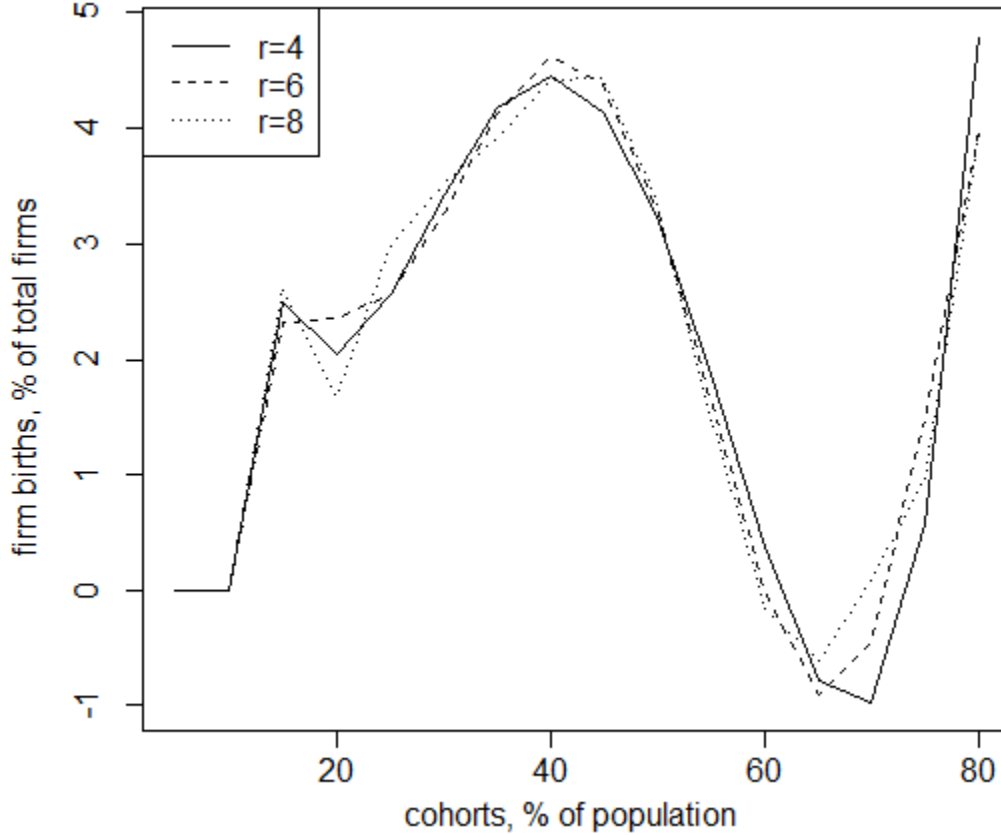
We estimate the parameters of the polynomials by minimizing the sum of squared errors of the model with the BFGS algorithm (Broyden 1970, Fletcher 1970, Goldfarb 1970, Shanno 1970). Then we calculate the estimates of $\beta_i, i = 1, \dots, 14$. Coefficients corresponding to 0-14-year generations are equalized to zero as before. The estimates of the parameters β_i are presented in

¹⁴ Results are available upon request.

¹⁵ The approach was originally proposed by Fair and Dominguez (1991).

Figure 4 for $r = 4, 6, 8$. In general, parameters are similar to those presented in Figure 2, but the profiles are much smoother.

Figure 4: Model parameters approximated with polynomials



6. Simulating the impact of demography on business dynamics

As an interesting thought experiment, and to illustrate possible applications of our results, we use them to simulate the impacts of ongoing demographic changes on business dynamics. Notably, we simulate the impacts of longer-term projected demographic changes (by 2025 and 2030) on firm entry.

In order to estimate firm entry rates, we use official UN forecasts of demographic structure. The UN forecasts are used as an input to Model 4 (both the versions presented in Table 1 and in Table 2). Table 3 presents the results of our estimations. The positive sign that appears for a number of estimates indicates that countries' population structure will become more favourable for firm entry in comparison to 2020.

Table 3 Demography impact on firms' entry rates by 2025 and 2030, %

Model 4, Table 1

Model 4, Table 2

		Growth by 2025	Growth by 2030	Growth by 2025	Growth by 2030
1	Lithuania	8.2981	15.9468	9.1432	10.7892
2	Latvia	5.9369	-2.2711	1.9782	-2.7457
3	Czech Republic	5.6351	10.2639	4.7439	4.3667
4	Poland	4.7113	15.0002	6.8930	13.0874
5	Spain	4.5668	9.1696	3.9577	5.8174
6	Portugal	1.9452	-0.0767	-0.6619	-3.1488
7	Netherlands	1.4058	2.4720	2.1379	5.4527
8	Denmark	1.0044	-1.0479	0.6574	0.0415
9	Belgium	0.8444	2.8991	2.3532	4.5696
10	Slovakia	0.5928	3.7742	3.5414	8.3057
11	Slovenia	0.4095	1.4315	3.5589	6.8664
12	Luxembourg	0.3930	1.3045	1.4829	3.2574
13	Greece	-0.1790	0.6845	0.5245	2.4997
14	Italy	-0.1941	-3.1622	2.6862	6.6064
15	Austria	-0.3749	1.5951	2.0069	5.1036
16	Croatia	-0.9108	-2.1734	-2.1501	-3.5731
17	UK	-1.7575	-5.8086	-1.9099	-4.1526
18	Sweden	-1.9481	-4.6342	-0.6788	-3.6548
19	Germany	-2.2988	-8.5406	-6.9426	-13.1023
20	Estonia	-3.4612	-1.4573	2.8196	7.0918
21	Ireland	-4.3051	-4.0548	-3.3230	-1.6300
22	Finland	-4.3135	-1.3563	0.5220	7.2087
23	France	-4.3998	-4.5817	-1.9388	-1.2113
24	Bulgaria	-7.6282	-6.6561	-5.2647	-1.7811
25	Romania	-8.4755	-12.9275	-9.4055	-7.4055
26	Hungary	-8.6516	-7.4346	-4.1545	-1.1756

The models from Table 1 and Table 2 provide rather different results for some countries because of the different treatment of elderly generations. The common feature is that by 2025, the largest positive demographic impact is estimated to be in Poland, Spain, Czech Republic, Latvia and Lithuania. The largest negative impact is expected in Romania, France, Ireland, Bulgaria and Hungary. By 2030, changes in demographic structure are expected to promote firm entry rates in Lithuania, Poland, Czech Republic, Slovakia, and reduce them in Hungary, Germany, Romania, and Bulgaria.

These forecasts should be treated with a caution. First, UN forecasts may change from the actual demographic developments due to migration, epidemics, and unexpected changes in fertility and mortality rates. Second, the exogenous variables in Model 4 (Table 1) which were used for producing our predictions explain only around 21% of variance in the dependent variable, while 79% of the variance remains unexplained or explained by fixed effects. The unexplained variation may depend on government regulations, economic environment and other factors. The coefficient

of determination in Model 4 (Table 2) is even lower. A lower coefficient of determination reduces the reliability of our predictions.

7. Conclusions

In this paper, we study the impact of changes in the population demographic structure on firm entry rates. Keeping population under 15-years-old as a control group, we find that the effects of cohorts between 15 and 70-years-old have a 'hump-shaped' profile, with the maximum arising around 40-54 years, depending on the model specification. Furthermore, the effect of generation 80+ is positive (in comparison to 0-14-years children), and statistically significant in most models with at least a 10% significance level. A possible explanation for the positive effect of generation 80+ is that a larger size of this generation reflects greater longevity, which in turn increases savings, reduces interest rates and therefore increases availability of external financing. After controlling for life expectancy and interest rates, the coefficient corresponding to the generation 80+ sharply declines and becomes insignificant.

Demography affects firm entry rates via various channels: entrepreneurship, labor market participation, demand. Further research in this field could separate these channels and estimate their relative importance. Moreover, an analysis of the nexus of demographic structure, firm entry rates and labour market institutions seems to be promising.

As longevity (proxied by the size of the 80+ cohort) seems to have a positive impact on firm entry, our results suggest that policy measures supporting longevity such as investment in health, including through preventive care, and human capital more broadly, can positively contribute to business dynamism.

Policy can also promote entrepreneurship and labour market participation for people over the age of 55. Policies increasing the affordability and quality of kindergartens and after-school child-care facilities can also help improve firm entry rates by increasing time availability of their parents.

8. References

- Adema, Y., Meijdam, L., & Verbon, H. A. (2008). Beggar thy thrifty neighbour. *Journal of Population Economics*, 21(4), 933-959.
- Aghion, P., Fally, T., & Scarpetta, S. (2007). Credit constraints as a barrier to the entry and post-entry growth of firms. *Economic Policy*, 22(52), 732-779.
- Aidis, R., Estrin, S., & Mickiewicz, T. M. (2012). Size matters: entrepreneurial entry and government. *Small Business Economics*, 39(1), 119-139.
- Aiyar, M. S., & Ebeke, M. C. H. (2017). The impact of workforce aging on European productivity. International Monetary Fund. WP/16/238.
- Akcigit, U., Ates, S.T. (2019) Ten facts on declining business dynamism and lessons from endogenous growth theory. NBER Working Paper 25755.

- Anderton, R., Di Lupidio, B., & Jarmulska, B. (2020). The impact of product market regulation on productivity through firm churning: Evidence from European countries. *Economic Modelling* 91, 487-501.
- Amidei, F. B., Gomellini, M., Incoronato, L., & Piselli, P. (2019) The Age-Productivity Profile: Long-Run Evidence from Italian Regions. CReAM Discussion Paper 19/20. Centre for Research and Analysis of Migration, University College London.
- Anson, J. (1988) Mortality and living conditions: Relative mortality levels and their relation to the physical quality of life in urban population. *Social Science & Medicine*, 27(9): 901-910.
- Arellano, M. (1987). Computing robust standard errors for within-group estimators. *Oxford Bulletin of Economics and Statistics*, 49(4), 431-434.
- Azoulay, P., Jones, B. F., Kim, J. D., & Miranda, J. (2020). Age and high-growth entrepreneurship. *American Economic Review: Insights*, 2(1), 65-82.
- Baptista, R., Lima, F., & Mendonça, J. (2011). Establishment of higher education institutions and new firm entry. *Research Policy*, 40(5), 751-760.
- Bellido, H., Marcén, M. (2019) Fertility and the business cycle: the European case. *Review of Economics of the Household*, 17: 1289-1319.
- Benkovskis, K., & Tkacevs, O. (2019). Getting Old Is No Picnic? Sector-Specific Relationship Between Workers Age and Firm Productivity. Discussion Papers 2019/03, Latvijas Banka.
- Bettin, G., Bianchi P., Nicolli F., Ramaciotti L., Rizzo U. (2019) Migration, ethnic concentration and firm entry: evidence from Italian regions. *Regional Studies* 53(1), 55-66.
- Bhaumik, S. K., Gangopadhyay, S., & Krishnan, S. (2007). Entry, reforms, complementarity and performance: A tale of two Indian manufacturing sectors. *Economic Systems*, 31(4), 375-390.
- Bijnens, G., Konings, J. (2020) Declining business dynamism in Belgium. *Small Business Economics*, 54: 1201-1239.
- Bloom, D. E., Canning, D., Mansfield, R. K., & Moore, M. (2007). Demographic change, social security systems, and savings. *Journal of Monetary Economics*, 54(1), 92-114.
- Bornstein, G. (2018). Entry and Profits in an Aging Economy: The Role of Consumer Inertia. mimeo.
- Börsch-Supan, A. and Weiss, M. (2016). Productivity and age: Evidence from work teams at the assembly line. *Journal of the Economics of Ageing*, 7, 30-42.
- Brandt, N. (2005). Business dynamics and policies. *OECD Economic Studies*, 2004(1), 9-36.
- Bravo-Biosca, A., Criscuolo, C., Menon, C. (2013), "What Drives the Dynamics of Business Growth?", OECD Science, Technology and Industry Policy Papers, No. 1, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5k486qtttq46-en>

- Breusch, T. S. (1978). "Testing for Autocorrelation in Dynamic Linear Models". *Australian Economic Papers*. 17: 334–355.
- Brown, J. D., Earle, J. S., Kim, M. J., & Lee, K. M. (2019). Start-ups, job creation, and founder characteristics. *Industrial and Corporate Change*, 28(6), 1637-1672.
- Broyden, C. G. (1970), "The convergence of a class of double-rank minimization algorithms", *Journal of the Institute of Mathematics and Its Applications*, 6: 76–90
- Bruno, R. L., Bychkova, M., & Estrin, S. (2013). Institutional determinants of new firm entry in Russia: A cross-regional analysis. *Review of Economics and Statistics*, 95(5), 1740-1749.
- Cabral, L., & Mata, J. (2003). On the evolution of the firm size distribution: Facts and theory. *American Economic Review*, 93(4), 1075-1090.
- Campos, N. F., & Iooty, M. (2007). Institutional barriers to firm entry and exit: Case-study evidence from the Brazilian textiles and electronics industries. *Economic Systems*, 31(4), 346-363.
- Cetorelli, N., & Strahan, P. E. (2006). Finance as a barrier to entry: Bank competition and industry structure in local US markets. *The Journal of Finance*, 61(1), 437-461.
- Cressy, R. (1996). Pre-entrepreneurial income, cash-flow growth and survival of startup businesses: model and tests on UK data. *Small Business Economics*, 8(1), 49-58.
- Decker, R.A., Haltiwanger, J., Jarmin, R., Miranda, J. (2016) Declining business dynamism: what we know and the way forward. *American Economic Review*, 106: 203-207.
- Dejardin, M. (2011). Linking net entry to regional economic growth. *Small Business Economics*, 36(4), 443-460.
- De Nardi, M., French, E., & Jones, J. B. (2009). Life expectancy and old age savings. *American Economic Review*, 99(2), 110-15.
- Desai, M., Gompers, P., & Lerner, J. (2003). Institutions, capital constraints and entrepreneurial firm dynamics: Evidence from Europe (No. w10165). National Bureau of Economic Research.
- Djankov, S., La Porta, R., Lopez-de-Silanes, F., Schleifer, A. (2002) The regulation of entry. *The Quarterly Journal of Economics*, 117(1): 1-37.
- Djankov, S. (2009) The regulation of entry: a survey. *The World Bank Research Observer*, 24(2): 183-203.
- Dobbs, R., Remes, J., Woetzel, J. (2016) Emerging Demographics Are the New Emerging Markets. *Harvard Business Review*, July 13, 2016.
- Duleep, H.O. (1986) Measuring the Effect of Income on Adult Mortality Using Longitudinal Administrative Record Data. *Journal of Human Resources*, 21(2): 238-251.
- Engbom, N. (2019) Firm and Worker Dynamics in an Aging Labor Market. Working Paper 756, Federal Reserve Bank of Minneapolis.

- Fair, R., Dominguez, K. (1991) Effects of the changing US age distribution on macroeconomic equations. *American Economic Review*, 81 (1991): 1276-1294.
- Fedotenkov, I. (2018). Population ageing and inflation with endogenous money creation. *Research in Economics*, 72(3), 392-403.
- Feyrer, J. (2007). Demographics and productivity. *The Review of Economics and Statistics*, 89(1), 100-109.
- Feyrer, J. (2008) Aggregate evidence on the link between age structure and productivity. *Population and Development Review*, 34, 78-99.
- Fletcher, R. (1970), "A New Approach to Variable Metric Algorithms", *Computer Journal*, 13 (3): 317–322.
- Fonseca, R., Parker, S.C. (2019) Entrepreneurship among older workers: international evidence. In: Backman, M., Karlsson, C., Kekezi, O. (eds.) *Handbook of Research on Entrepreneurship and Aging*. Edward Elgar Publishing.
- Fritsch, M. (1997). New firms and regional employment change. *Small Business Economics*, 9(5), 437-448.
- Geroski, P.A. (1995) What do we know about entry? *International Journal of Industrial Organization*, 13: 421-440.
- Göbel, C., & Zwick, T. (2012) Age and productivity: Sector differences. *De Economist*, 160: 35-57.
- Godfrey, L. G. (1978). "Testing Against General Autoregressive and Moving Average Error Models when the Regressors Include Lagged Dependent Variables". *Econometrica*. 46: 1293–1301.
- Goldfarb, D. (1970), "A Family of Variable Metric Updates Derived by Variational Means", *Mathematics of Computation*, 24 (109): 23–26.
- Gustke, C. (2016) The Hottest Start-Up Market? Baby Boomers. The New York Times, August 3, 2016. <https://www.nytimes.com/2016/08/04/business/smallbusiness/the-hottest-start-up-market-baby-boomers.html>, Accessed July 9, 2021.
- Haaland, V.F., Telle, K. (2015) Pro-cyclical mortality across socioeconomic groups and health status. *Journal of Health Economics*, 39: 248-258. <https://doi.org/10.1016/j.jhealeco.2014.08.005>
- Hartshorne, J. K., & Germine, L. T. (2015). When does cognitive functioning peak? The asynchronous rise and fall of different cognitive abilities across the life span. *Psychological Science*, 26(4), 433-443.
- Huart, F., Tchakpalla, M. (2019) Labour market conditions and geographic mobility in the Eurozone. *Comparative Economic Studies*, 61(2): 263-284.

- Juselius, M., & Takáts, E. (2021). Inflation and demography through time. *Journal of Economic Dynamics and Control*, 128, 104136.
- Hopenhayn, H., Neira, J., & Singhania, R. (2018). From population growth to firm demographics: Implications for concentration, entrepreneurship and the labor share (No. w25382). National Bureau of Economic Research.
- Kaplan, D., Piedra, E., Seira, E. (2011) Entry regulation and business start-ups: Evidence from Mexico. *Journal of Public Economics*, 95(11): 1501-1515.
- Kautonen, T., Down, S., Minniti, M. (2014) Ageing and entrepreneurial preferences. *Small Business Economics*, 42: 579-594.
- Key, T. J., Thorogood, M., Appleby, P. N., & Burr, M. L. (1996). Dietary habits and mortality in 11 000 vegetarians and health conscious people: results of a 17 year follow up. *Bmj*, 313(7060), 775-779.
- Kinugasa, T., & Mason, A. (2007). Why countries become wealthy: the effects of adult longevity on saving. *World Development*, 35(1), 1-23.
- Klapper, L., Laeven, L., & Rajan, R. (2006). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics*, 82(3), 591-629.
- Kopecky, J. (2019) An aging dynamo: demographic change and the decline of entrepreneurial activity in the United States. Working paper.
- Kritikos, A. S. (2014). Entrepreneurs and their impact on jobs and economic growth. *IZA World of Labor*, 8, 1-10.
- Kropp, F., Lindsay, N. J., & Shoham, A. (2008). Entrepreneurial orientation and international entrepreneurial business venture startup. *International Journal of Entrepreneurial Behavior & Research*, 1(2), 102-117.
- Lallemand, T., Rycx, F. (2009) Are older workers harmful for firm productivity? *De Economist*, 157: 273-292.
- Lesthaeghe, R., & Neels, K. (2002). From the first to the second demographic transition: an interpretation of the spatial continuity of demographic innovation in France, Belgium and Switzerland. *European Journal of Population/Revue européenne de démographie*, 18(4), 325-360.
- Lévesque, M., Minniti, M. (2006) The effect of ageing on entrepreneurial behavior. *Journal of Business Venturing*, 21: 177-194.
- Liang, J., Wang, H., & Lazear, E. P. (2018). Demographics and entrepreneurship. *Journal of Political Economy*, 126(S1), S140-S196.
- Lindh, T., Malmberg, B. (1998) Age structure and inflation – a Wicksellian interpretation of the OECD data. *Journal of Economic Behavior & Organization*, 36: 19-37.

- Mahlberg, B., Freund, I., Prskawetz, A. (2013) Ageing, productivity and wages in Austria: sector-level evidence. *Empirica*, 40: 561-584.
- Mondragón-Velez, C. (2009) The probability of transition to entrepreneurship revisited: wealth, education and age. *Annals of Finance*, 5: 421-441.
- Mundlak, Y. (1978). On the pooling of time series and cross section data. *Econometrica*, 46(1), 69-85.
- Neumark, D., & Yen, M. (2020). Relative Sizes of Age Cohorts and Labor Force Participation of Older Workers. *Demography*, 57(1), 1-31.
- OECD (2017), Entrepreneurship at a Glance 2017, OECD Publishing, Paris, https://doi.org/10.1787/entrepreneur_aag-2017-en.
- Patterson, I., Sie, L., Balderas-Cejudo, A., Rivera-Hernaez, O. (2017) Changing Trends in the Baby Boomer Travel Market: Importance of Memorable Experiences. *Journal of Hospitality Marketing & Management*, 26(4): 347-360.
- Ruhm, C.J. (2000) Are recessions good for your health? *Quarterly Journal of Economics*, 115 (2): 617-650. doi 10.1162/003355300554872
- Saks, R.E., Wozniak, A. (2011) Labour reallocation over the business cycle: new evidence from internal migration. *Journal of Labor Economics*, 29(4): 697-739.
- Schumpeter, J. (1942) Capitalism, socialism, and democracy. New York: Harper & Bros.
- Shanno, D. F. (1970), "Conditioning of quasi-Newton methods for function minimization", *Mathematics of Computation*, 24 (111): 647-656
- Tang, J., & MacLeod, C. (2006). Labour force ageing and productivity performance in Canada. *Canadian Journal of Economics/Revue canadienne d'économique*, 39(2), 582-603.
- Thomas, L., Roy, A. (2016) More start-ups are targeting baby boomers. CNBC. <http://www.cnbc.com/2016/08/11/more-start-ups-are-targeting-baby-boomers.html>. Accessed 9 July 2021.
- Thum-Thysen, A., & Raciborski, R. (2017). Determinants of trend TFP growth and key policies that influence it. *Quarterly Report on the Euro Area (QREA)*, 16(2), 31-41.
- Zhang, J., & Zhang, J. (2005). The effect of life expectancy on fertility, saving, schooling and economic growth: theory and evidence. *Scandinavian Journal of Economics*, 107(1), 45-66.

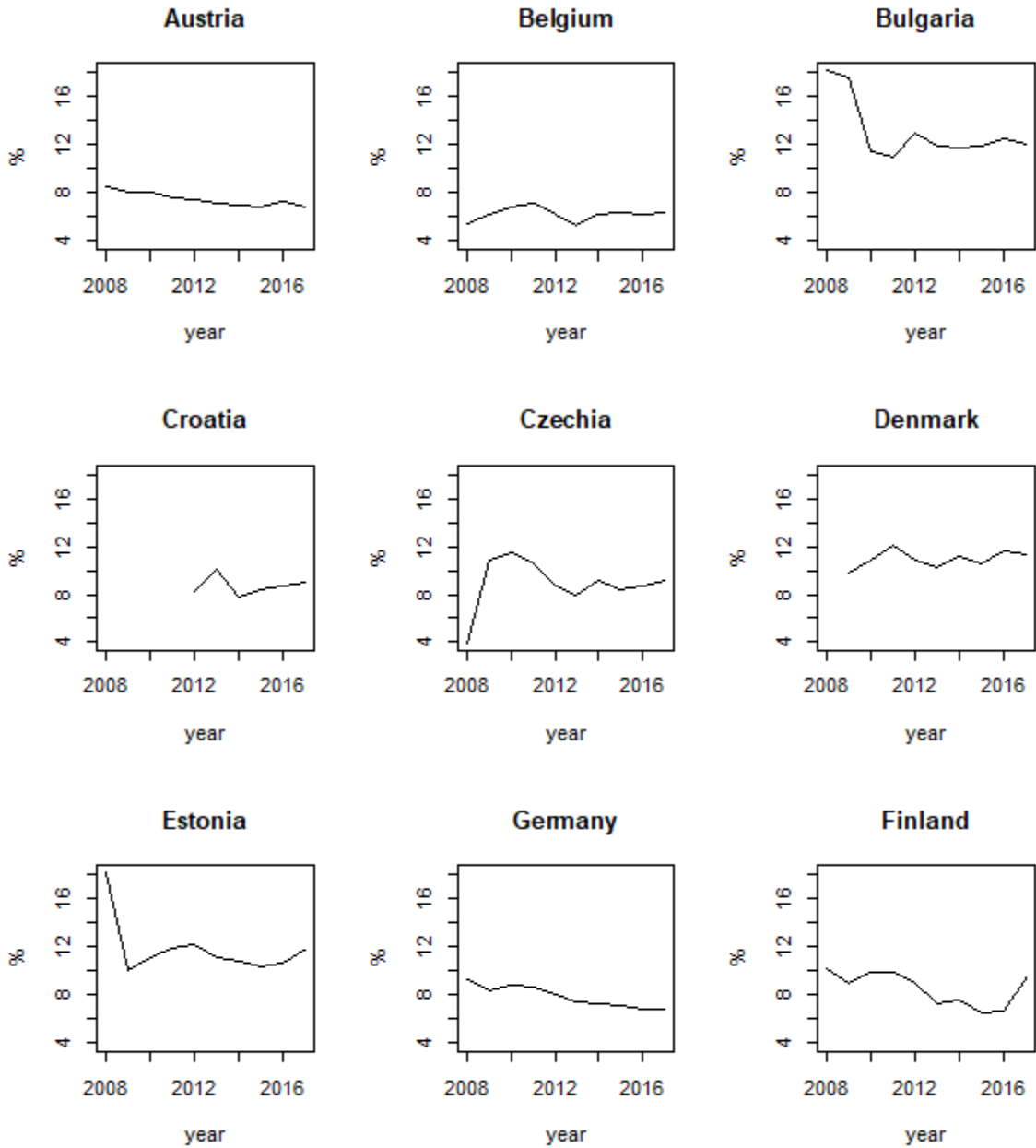
Appendix A

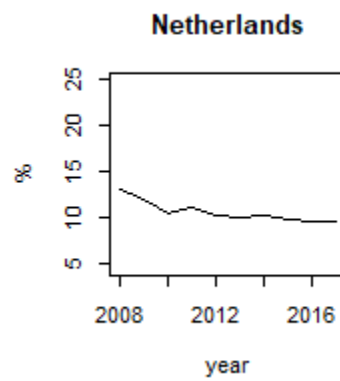
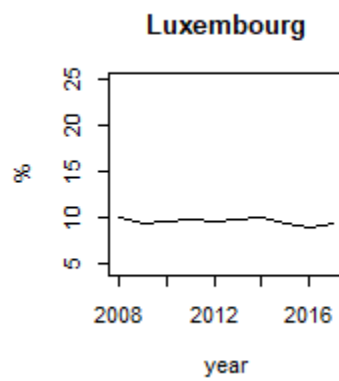
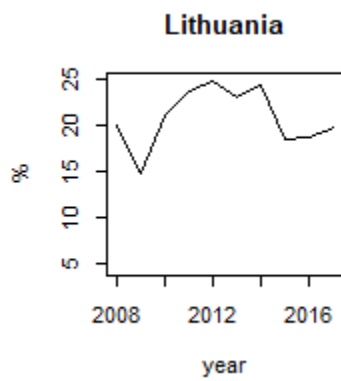
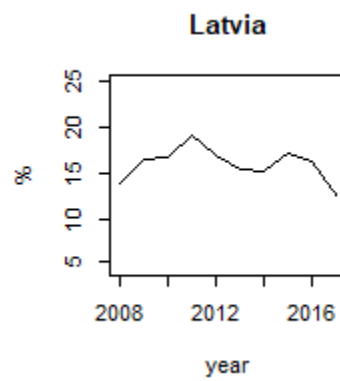
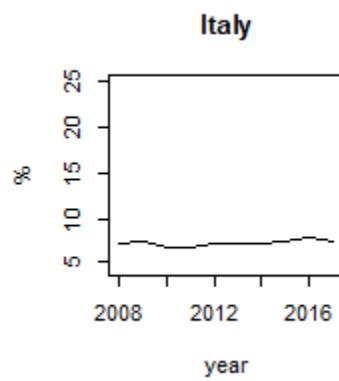
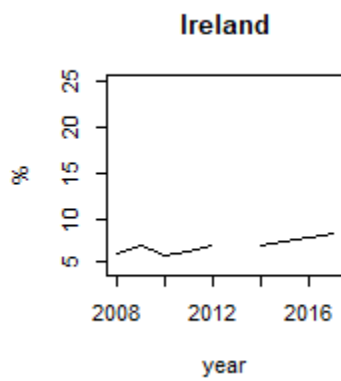
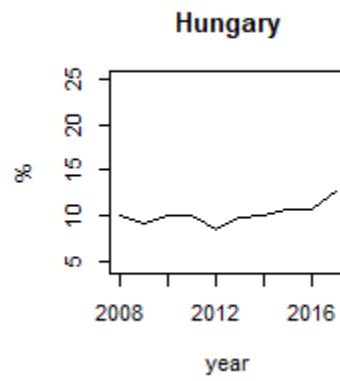
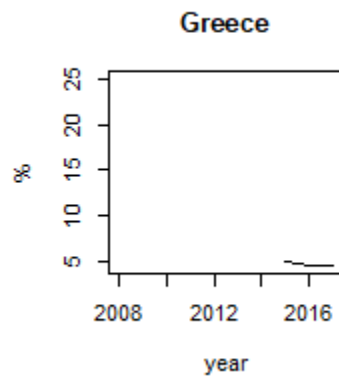
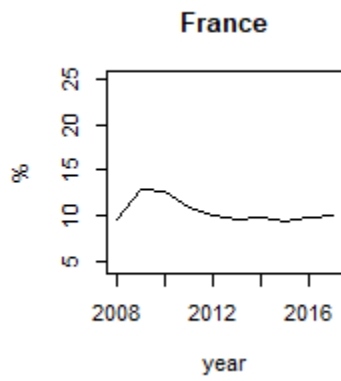
Table 4: Summary statistics

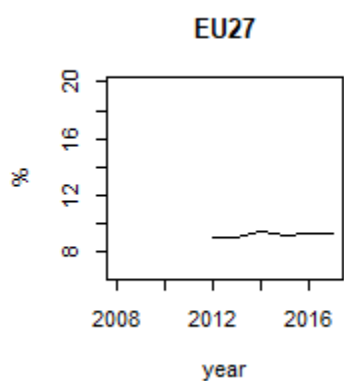
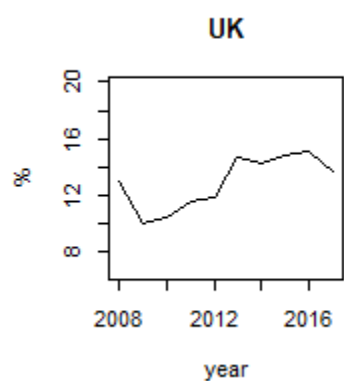
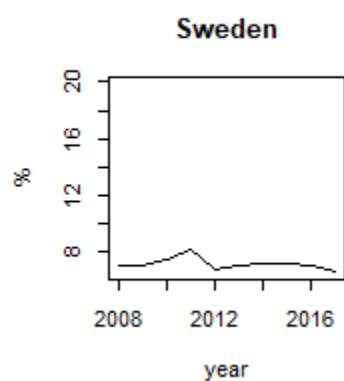
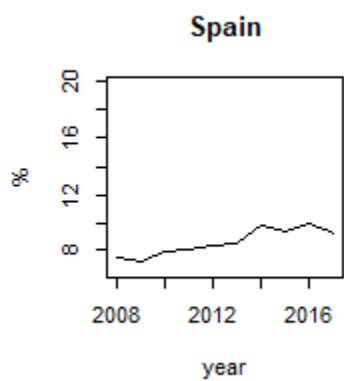
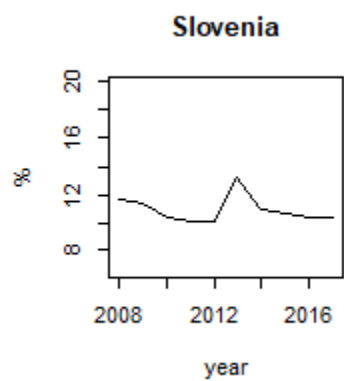
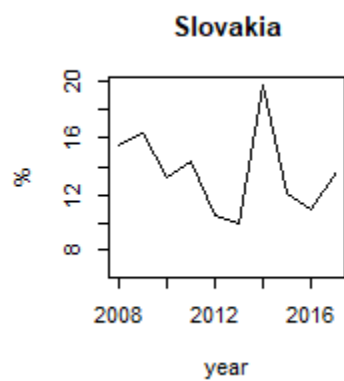
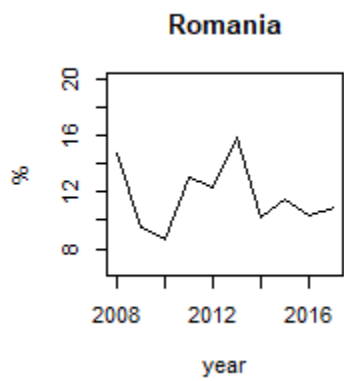
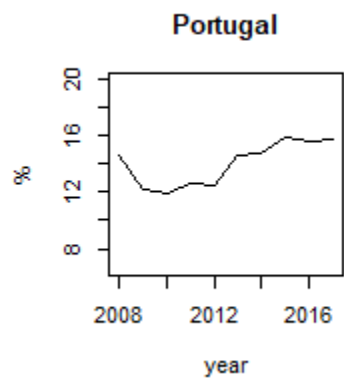
	Mean	St.Dev.	Median	Min	Max
Dependent variable					
Firms' entry rate	10.409	3.5477	9.9800	3.810	24.88
Exogenous variables					
Gen 15-19	5.6068	0.6848	5.6504	4.0661	7.4791
Gen 20-24	6.2260	0.7040	6.1988	4.8929	8.0076
Gen 25-29	6.6468	0.6958	6.6135	5.2603	8.6773
Gen 30-34	6.9569	0.8257	6.7977	5.4872	8.8924
Gen 35-39	7.1773	0.7787	7.0735	5.7909	8.8438
Gen 40-44	7.2252	0.6521	7.1181	5.7289	8.6751
Gen 45-49	7.1890	0.6343	7.1536	5.5578	8.6691
Gen 50-54	6.9973	0.5594	6.9911	5.5042	8.4727
Gen 55-59	6.6229	0.5810	6.6394	5.4477	7.9807
Gen 60-64	6.0548	0.6709	6.0417	4.6485	7.9807
Gen 65-69	5.1543	0.7228	5.1485	3.4755	7.0542
Gen 70-74	4.2905	0.6415	4.3422	2.7040	5.9208
Gen 75-79	3.5269	0.6064	3.5248	1.9369	5.1544
Gen 80+	4.6060	0.9351	4.6205	2.5640	7.0716
Control variables					
Migrants (%)	11.277	7.6468	11.616	0.9651	45.837
Population growth	0.1330	0.7657	0.1625	-2.2842	2.4017
Property right index	70.184	19.187	70	30	95
Costs, starting business	4.8388	5.2265	2.65	0	22.5
Control of corruption	1.0172	0.8240	0.9862	-0.2673	2.4465
Life expectancy	78.965	2.9894	80.311	71.812	83.329

Appendix B

Figure 5: Firm entry rates in the EU







Appendix C

Table 5: Dependent variable: Firm entry rate. Specification with 10-year cohorts

	Model 1	Model 2	Model 3	Model 4
Gen 20-29	0.0011 (0.3281)	0.3763 (0.3383)	0.4626 (0.3415)	0.4903 (0.3452)
Gen 30-39	0.1049 (0.4530)	0.9671* (0.4795)	1.2350** (0.5138)	1.3417** (0.5439)
Gen 40-49	0.8183* (0.4526)	1.4932*** (0.4795)	1.8746*** (0.7971)	1.9248*** (0.5393)
Gen 50-59	0.4674 (0.4868)	1.1445** (0.5156)	1.5154*** (0.5593)	1.5343*** (0.5612)
Gen 60-69	-0.4815 (0.5419)	-0.3603 (0.4772)	-0.2634 (0.4793)	-0.2795 (0.4810)
Gen 70-79	0.0791 (0.5058)	0.7414* (0.3973)	0.8795** (0.4027)	0.8975** (0.4045)
Gen 80+	0.2794 (0.8512)	1.4698* (0.8107)	1.9955** (0.8500)	2.1142** (0.8737)
Migrants (%)		0.0011 (0.0864)	-0.0054 (0.0860)	-0.0777 (0.0863)
Population growth		-0.5518 (0.3527)	-0.7692** (0.3695)	-0.7240* (0.3776)
Property right index			-0.0364* (0.0204)	-0.0324 (0.0214)
Costs, starting business			0.1304 (0.0953)	0.1343 (0.0957)
Control of corruption				-0.6659 (1.0958)
R ²	0.0780	0.1329	0.1545	0.1563
R ² -adj	-0.1102	-0.0324	-0.0185	-0.0223
N	237	207	207	207
DF	196	173	171	170