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EU start-up calculator: impact of COVID-19 on aggregate employment

Scenario analysis for Bulgaria, Croatia, Czechia, Luxemburg, Netherlands, Poland, Romania, Slovakia and Slovenia

Benedetti Fasil, C.
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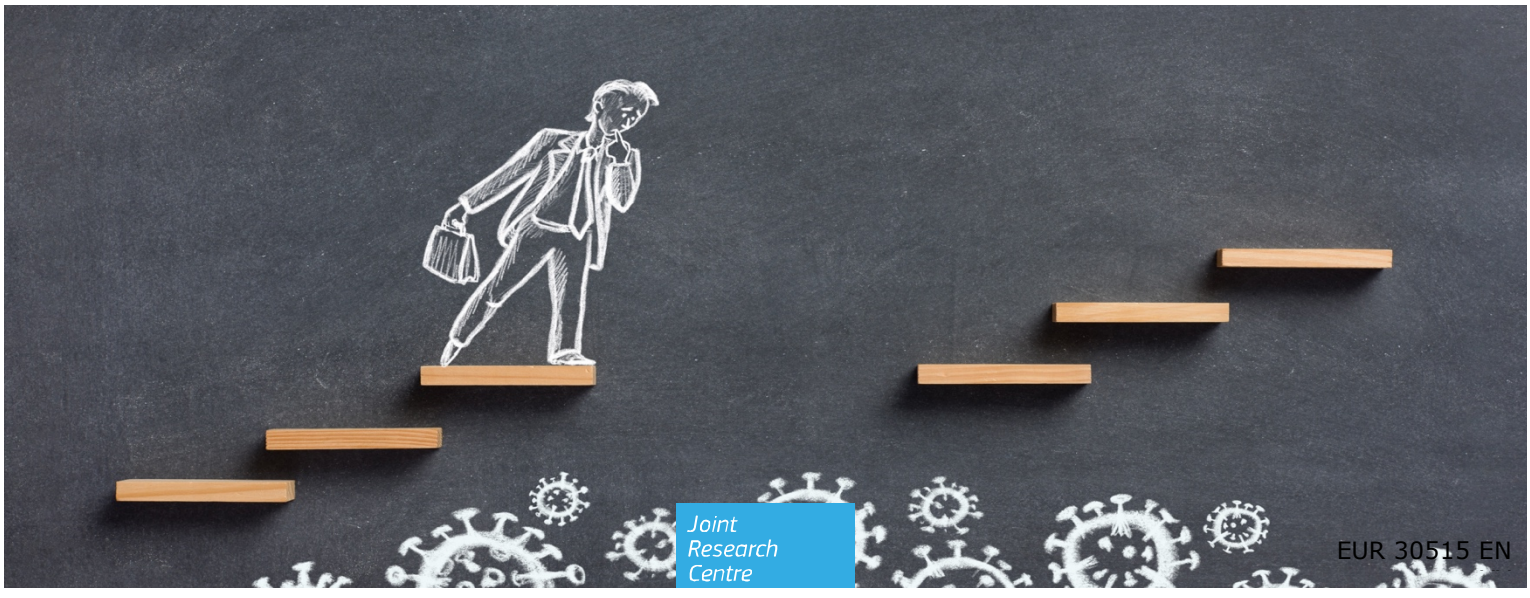
2020



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Contents

Foreword

This paper is the third and last of a series of publications that use a newly developed EU start-up calculator. This is a simulator that allows to assess the disruptive impact of COVID-19 on start-up activity and ultimately aggregate employment in the European Union Member States. The paper explains the tool and performs scenario analysis for Bulgaria, Croatia, Czechia, Luxemburg, the Netherlands, Poland, Romania, Slovakia and Slovenia. After a general introduction and presentation of the tool, the presentation of the scenario analysis of each country is self-contained. This allows the reader to focus directly on the countries of interest.

The first report, Benedetti Fasil, Sedláček and Sterk (2020), presents a similar structure and discusses the scenario analysis for Austria, Belgium, Germany, Hungary, Italy and Spain, while the second report, Benedetti Fasil, Sedláček and Sterk (2020b) analysis Denmark, Estonia, Finland, France, Latvia, Lithuania, Portugal and Sweden. The analysis cannot be carried out for Cyprus, Greece, Ireland and Malta due to the lack of the necessary EuroStat data.

The start-up calculator has been firstly developed by Sedláček and Sterk (2020) and applied to the US economy. It has subsequently been adapted to fit the employment profile of young firms in individual EU Member States.

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Abstract

Early data show that the COVID-19 pandemic has affected particularly strongly start-up business activity. This may have dramatic and lasting effects on aggregate employment which persist as the cohort of new firms age. To assess such an impact, we developed the EU start-up calculator. A first application targeted to Austria, Belgium, Germany, Hungary, Italy and Spain is discussed in Benedetti Fasil, Sedláček and Sterk (2020a) and a second focusing Denmark, Estonia, Finland, France, Latvia, Lithuania, Portugal and Sweden is presented in Benedetti Fasil, Sedláček and Sterk (2020b). The EU start-up calculator is an empirical tool that allows to conduct scenario analysis to compute the impact that the disruption of start-up activity has on aggregate employment on EU Member States and their economic sectors. In this paper, we simulate the effects of a strong (i.e. of magnitude equivalent to the Great Recession of 2008 and 2009) but short-lived (i.e. lasting one-year) crisis in Bulgaria, Croatia, Czechia, Luxemburg, the Netherlands, Poland, Romania, Slovakia and Slovenia. This shock generates important and persistent job losses in all the countries ranging between 0.25 (Luxemburg) and 6.9% (Slovakia) of negative deviation from the employment trend in 2020 and results in a computed potential cumulative loss of jobs for the period 2020-2030 ranging from 5,600 (Luxemburg) to 2179,000 (Poland). The potential negative impact is particularly high in Bulgaria, Croatia, Poland, Romania and Slovakia as well as in the service sector, which are characterized by a high firm turnover and a reliance on start-ups and young firms for job creation. We also find that in most countries the deterioration of the survival rate of young firms plays an important role in driving employment, seconded by the number of new entrants. As a consequence, policies aimed at supporting young firms and incentivizing the creation of new ones may significantly mitigate the medium-term effect of the pandemic. In fact, when we simulate bounce-back scenarios where the number of firms entering the economy rapidly increases in 2021, in every country the outlook is significantly improved, the recovery is faster and the aggregate job loss is lower.

Key words: COVID-19, start-ups, employment

1 Introduction

The EU start-up calculator is an empirical tool that allows researchers and policy analysts to compute an estimate of the medium-run impact, i.e. up to 2030, that COVID-19 may have on aggregate employment due to the disruption of start-ups and young firms. The calculator allows to create different scenarios with the possibilities to vary three margins: (i) the number of start-ups, (ii) the survival rate of young firms and (iii) the growth potential of start-ups (i.e. the post-entry growth of firms in terms of employment). The start-up calculator uses publicly available data from Eurostat allowing analysis of the whole economy, the industrial and service sectors in each Member State.

The focus is on the impact of COVID-19 on the employment-generating potential of start-ups and young firms. For the purpose of this paper, start-ups are firms age zero or new entrants, while young firms are less than six years old from when they registered as a new business. This category of firms is particularly important for a dynamic and productive economy. Start-ups and young firms are job creators and account for a large share of employment in the EU Member States (Figure 1). At the EU 27 level, 35% of firms are less than 5 years old and account for 12% of total European employment, with start-ups accounting for 2.5%. Figure 1 shows that in Bulgaria, Croatia, Czechia, Poland and Slovakia young firms are particularly relevant actors in terms of their contribution to aggregate employment when compared to the EU average. In fact, among these countries the share of employment of young firms ranges between 10.71% in Czechia and 19.41% in Croatia. Even more striking is the disproportional contribution of start-ups and young firms to employment growth. In the EU 27, young firms accounted for 36% of employment growth in the period 2013-2017. This pattern is qualitatively present also in the other European countries analysed which show a contribution of young firms to employment growth ranging between 2.62% in Luxemburg to 53.42% in Poland. Figure A1 in Appendix I reports the same descriptive statistics for a larger set of EU Member States.

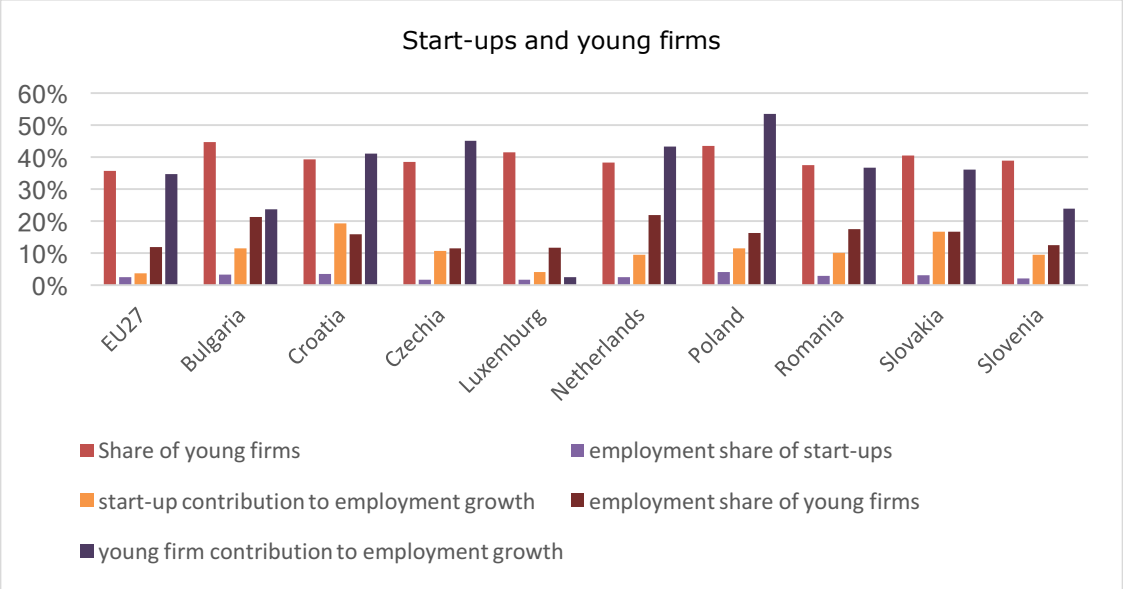


Figure 1. Importance of start-ups and young firms for aggregate employment

Source: JRC, Eurostat, Business Demography dataset, 2020.

Note(1): The time series for the EU27, Bulgaria, Croatia, Poland and Slovakia is between 2012 and 2017, for Czechia, Luxemburg, Netherlands, Romania and Slovenia between 2008 and 2017.

Importantly, start-ups are also pivotal for the *creation* of new jobs. Figure 2 shows net job creation (i.e. creation minus destruction) by firm age, in the same set of countries. On average, the employment share of start-ups accounts for 1.8 in Czechia and Luxemburg to 4.5% in Poland of aggregate employment. Thus, a lack of start-up activity can lead to an important loss of aggregate employment. Figure 2 also shows that for firms of age 1 the contribution to net-job creation is substantially lower and even negative for Croatia and Poland. Beyond age 1, net job creation is negative in all the countries. That is, these age groups on average destroy more jobs (either via exit or scaling back) than they create. Again, this highlights the importance of start-ups in sustaining aggregate employment. Finally, the figure suggests that there is substantial variation across countries in the importance of start-ups for job creation, although qualitatively the patterns are similar. The interested reader can refer to Figure A2 in Appendix I to assess the net job creation in a larger set of EU Member States.

At the same time, start-ups (i.e. firms age 0 in Figure 2) and young firms find themselves in a fragile stage of their firm life-cycle being more susceptible to disruption of supply chains, a drop in demand for their products or services, limited access to funding and more stringent regulations. For this reason, the COVID-19 pandemic and its consequences in terms of containment measures adopted, changes in consumer preferences, increased uncertainty and related economic crisis is deemed to impact particularly strongly on start-ups and young firms. This is confirmed by recent data (available for sub-set of countries) on the number of new business registrations in the first semester of 2020 which show a sharp decline with respect to the same months of the previous year across several EU countries. Figure 3 shows how the number of new companies created declines in the first and second quarter of 2020 with respect to the first and second quarter of 2019, i.e. -20.67% in Q1 and -39.55% in Q2 in Romania, 3.71% in Q2 in the Netherlands, -35.46% in Q1 and -38.95% in Q2 in Romania, -3.73% in Q1 and -24.66% in Q2 in Slovakia, -8.55% in Q1 and -35.86 in (Figure A3 in Appendix I considers the annual variations for a larger set of EU Member States). These data hide large monthly drops in the number of new start-ups registered during the lockdowns and the consequent freeze of administrative activities. For instance, at the height of the first wave in Bulgaria the number of start-ups dropped by more than 65%, in Romania by 81%, in Slovakia by 45% and in Slovenia by about 78%, in all cases, in April 2020 compared to April 2019.[1] The resulting decline in job creation potential, due to the missing generation of start-ups, can have a dramatic and lasting effect on aggregate employment that persists as the cohorts of new firms mature (see Gourio et al. (2016) and Sedláček (2020)).

[1] See Section 4 for further data on each country analysed in this paper.

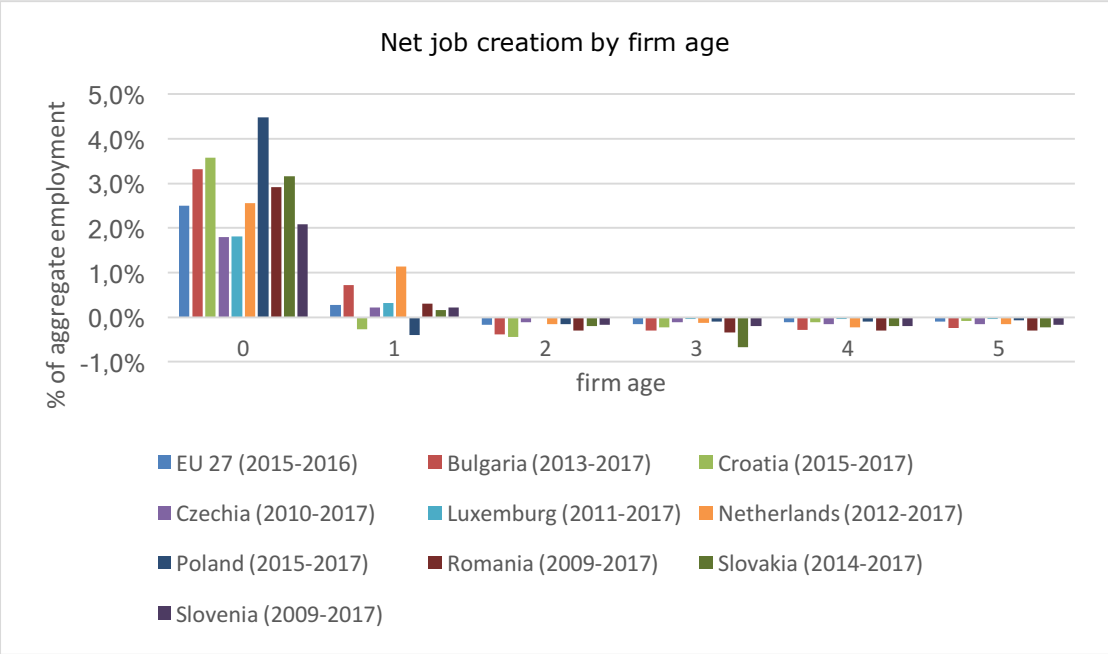


Figure 2. Importance of start-ups for job creation

Source: JRC, Eurostat, Business Demography dataset, 2020.

Acknowledging that challenging times may spark radical innovations (e.g. teleworking, contact-tracing applications) and the creation of new successful enterprises, the COVID-19 crisis is likely to affect negatively not only the start-up rate but also the survival rate of young firms and the growth potential of start-ups for which we do not have available data yet. In general, data show that start-ups and young firms have a much higher exit rate than older firms. Figure 4 shows the evolution of the average survival rate of start-ups during the first five years of activities. In particular, in the EU 27 about 20% of start-ups exit the market during their first year of activity, 43% within three years and only about half survive for five years.[2] Survival rates also vary across countries. For instance, in Bulgaria and Slovakia about 20% of start-ups exit during their first year while more than half survives longer than five years. Instead in the Netherlands less than 7% of start-ups survive their first year of operation, while then half survive the first five years. Figure A4 in Appendix I shows the survival rates for a larger set of EU Member States. Furthermore, the literature suggests that the exit rates of young firms increase during downturns (e.g. Haltiwanger, Jarmin, and Miranda (2013)). Moreover, Sedláček and Sterk (2017) show that the growth potential of firms is linked to the business cycle. During business cycles job creation by start-ups and aggregate employment growth co-move and drop during recessions with a correlation between entrants employment and aggregate employment growth (GDP growth) of 0.36 (0.45). Hence, firms born during recessions are in general smaller and tend to stay smaller during their life-cycle. This is indicative that companies like Uber or Airbnb, born during previous crisis, represent an exception rather than a rule.

[2] Also business survival rates for Europe provided by statista.com show a similar pattern: in 2017 almost one in five start-ups exited the market within the first year of operation, about 58% of new companies survived for three years and only 44% survived for five years. Some sectors, such as the IT sector seems to be particularly characterized by high exit rates. CBInsights.com reports that about 70% of tech start-ups fail within 20 months after obtaining financing, and about 97% of consumer hardware start-ups eventually fail.

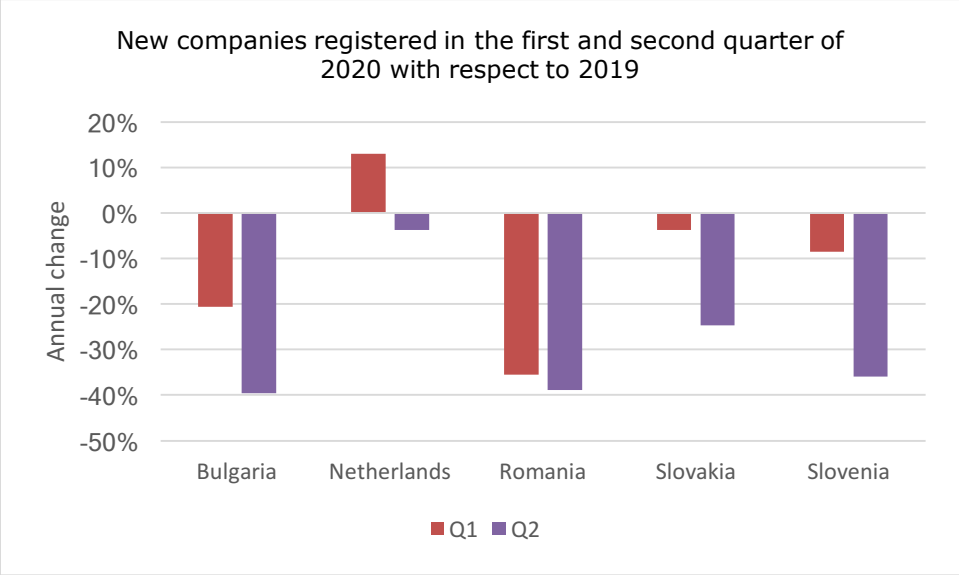


Figure 3. Annual change in the number of new companies registered in the first and second quarter of 2020 with respect to the first and second quarter of 2019 (percentage)

Source: JRC, data from the Bulgarian National Statistical Institute (BNSI), Netherlands StatLine (CBS), the Romanian National Trade Statistical Office (ONRC), the Slovak statistical office (www.statistics.sk) and the business register of Slovenia (AJPES).

Note(1): The data, which come from national statistical offices or enterprise registers, are not harmonized across countries. As a consequence, Figure 3 does not allow for quantitative cross-country comparisons *per se*. Nevertheless, it is useful to visualize the different impact that COVID-19 has had across countries in terms of start-up creation. Finally, we were unable to obtain data for Croatia, Czechia, Luxemburg and Poland.

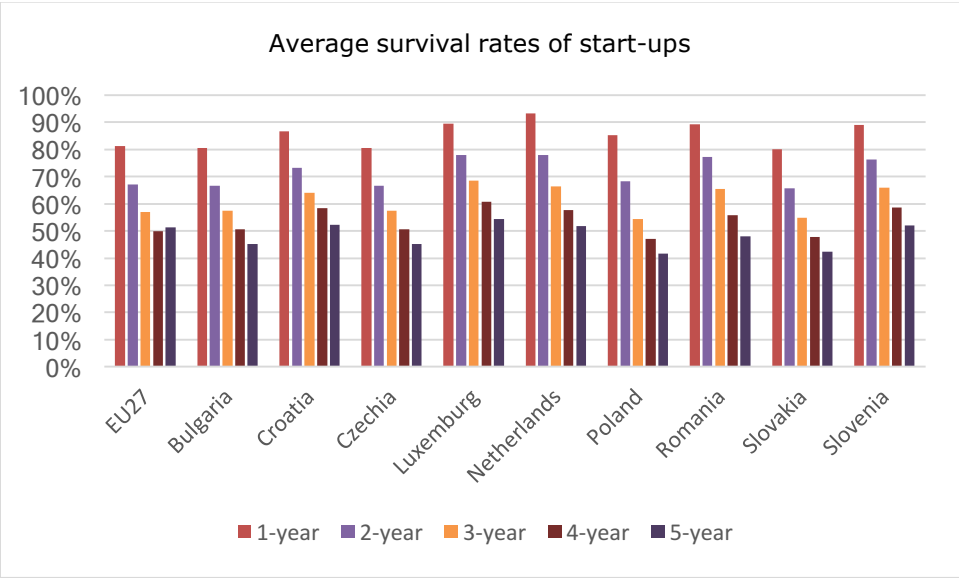


Figure 4. Y-o-y survival rate of start-ups

Source: JRC, Eurostat, Business Demography dataset, 2020.

Note(1): The Eurostat database provides the y-o-y survival rates for start-ups (age zero), after one, two, three, four and five years of activities. The plotted percentages are the averages of the period from 2013 to 2017 for the EU 27 and Croatia, from 2008 to 2018 for Bulgaria, Czechia, Luxemburg, Netherlands, Poland, Romania, Slovakia and Slovenia.

At this point of the COVID-19 pandemic it is not clear whether the current economic crisis will be short lived or sustained over a much longer period and if the implications for start-ups will be consistent with what has been documented during previous economic downturns. For this reason, our baseline scenario assumes a strong but brief contraction with start-up activities affected negatively by the crisis, i.e. the number of start-ups, their growth potential and the survival rate of young firms drop for only one year to a level corresponding to that experienced during the Great Recession of 2008 and 2009 (or drop to the *minima* of the underling Eurostat time series). This baseline scenario constitutes a plausible scenario and we postpone to further research the analysis of alternatives conjectures. According to the EU start-up calculator, this scenario would create substantial and persistent aggregate employment losses, especially in Bulgaria, Croatia, Poland, Romania and Slovakia. A full recovery to realign employment to its pre-crisis trend may take about a decade, even if start-up activity recovers to its pre-crisis level in one year.[3] The outlook is considerably improved in every country if specific policies would be introduced in 2021 targeted at increasing the number of firms entering the economy. Likewise, policies aimed at increasing the survival rate of young firms would also be quite effective in mitigating the negative impact of the crisis.[4] These results suggest that policy makers have ample space of manoeuvre for policies specifically targeting an easily identifiable category of firms, i.e. start-ups and young firms. Finally, in all the countries analyzed, the service sector may be affected more than the industry and manufacturing sectors, as young firms are important job creators in this sector. This also in the case in which the three margins are shocked symmetrically across sectors as the calculator embeds the employment structure of each sector considered.

In what follows, Section 2 introduces the EU start-up calculator. Section 3 discusses the data used and the methodology adopted to create the simulator. Section 4 applies the calculator to simulate how the destruction of start-up activities affects aggregate employment in Bulgaria, Croatia, Czechia, Luxemburg, the Netherlands, Poland, Romania, Slovakia and Slovenia. Business dynamism and scenario analysis are discussed separately for each country. A cross-country comparison is deferred to when the tool will be available for a larger set of Member States. Section 5 concludes.

[3] The persistence of our results is aligned to similar simulations based on the OECD DynEmp3 Database performed by Calvino et al. (2020). They evaluate the impact on aggregate employment over 3 to 14 years of a 20% decline in the number of entering firms in a year as average across 15 countries.

[4] For instance, Germany is initiating a start-up program aiming at supporting and expanding venture capital financing, France has created a 4 billion euros fund to support young firms liquidity, Italy has created the programme "Smart&Start Italia" which allocates 100 million euros to refinance innovative start-ups, as well as 200 million euros to support venture capital financing. This adds to further programs aiding start-ups and young firms with training and couching and the 34 billion euros more generally assigned to support liquidity needs of SMEs.

2 What is the start-up calculator?

The EU start-up calculator is an empirical tool which allows researchers and policy analysts to compute the medium-run impact, up to 2030, that COVID-19 has on aggregate employment due to the destruction of the activities of start-ups and young firms. In the context of this study, start-ups are defined as firms of age 0, i.e. newly registered firms, and young firms are those up to 5 years old. The calculator was firstly developed by Sedláček and Sterk (2020) for the US economy and then adapted to fit the employment profile of young firms in the EU Member States using publicly available Eurostat data (Benedetti Fasil et al (2020a) and Benedetti Fasil et al (2020b).[5]

The EU start-up calculator will be made publically available as a web-based tool by the end of 2020. A user will be able to easily simulate the time path for aggregate employment for a given scenario of start-up activity. Different scenarios can be created varying the following three parameters or "margins"[6] (in economics parlance) related to entry, exit and growth of young firms which tend to worsen during a recession:

i) *the number of start-ups*, i.e. shift the number of start-ups (for incoming cohorts).
ii) *the survival rate of young firms*: i.e. shift the profile of firm survival rates by age (for all firms up to age fifteen).
iii) *the growth potential of start-ups*: i.e. shift the profile of average size by age (for incoming cohorts).

A decline in the number of start-ups directly translates into a decline in the number of new jobs created and hence employment. Furthermore, this lost generation of firms creates a persistent dent in aggregate employment as subsequent years will be characterized by a lower number of firms (see for instance Gourio, Messer, and Siemer (2016) and Sedláček (2020)). The survival rate of young firms is directly linked to their exit rate. In general, start-ups and young firms are more fragile than established incumbents. This fragility is exacerbated during recessions - see Haltiwanger, Jarmin, and Miranda (2013). An economic consequence of this pandemic is expected to be a higher exit rate of young firms, a lower firm survival rate and, thus, more job destruction. Finally, the growth potential of start-ups entering the economy in 2020 is expected to decline. Firms that are born during a recession start smaller and tend to stay smaller even when the economy has recovered as shown by Sedláček and Sterk (2017). Changing the growth potential margin will result in shifting downwards the entire growth of the employment profile of the cohort of companies entering the market in 2020.

When creating a scenario changing the three margins, the calculator computes the implied time-dependent changes in aggregate employment for the given country and sector from 2020 to 2030 and the cumulative job loss. The flexibility of the tool permits the user to analyse the overall employment effects or outcomes by country and sector resulting from different degrees of severity of the economic impact that COVID-19 has on start-ups and young firms. The scenarios can reflect V-, U-, W- or L- shaped recessions with the analysis being comparable across economic sectors and countries. The user should constrain the flexibility of the tool with knowledge of the possible impacts of COVID-19 on the three margins are likely to be in order to analyse plausible scenarios.

[5]The start-up calculator for US is available at the following website http://users.ox.ac.uk/~econ0506/Main/StartupCalculator.html

[6] where a marginal change is a relaxing or tightening of constraints or the response which this relaxation or tightening produces

3 Data and methodology

The EU start-up calculator is tailored to individual Member States. It allows scenarios to be analysed for the whole business economy, the industrial sector, the manufacturing sector and the service sector.[7] It uses data from Eurostat Business Demography Statistics on the number of firms, persons employed, average size and survival rate of cohorts of firms for the age bins 0, 1, 2, 3, 4, 5, and all covering the years from 2008 to 2017 for Czechia, Luxemburg, the Netherlands, Romania and Slovenia and from 2012 to 2017 for Bulgaria, Croatia, Poland and Slovakia. It considers data of only employer businesses, that is businesses that have at least one employee.

The data for 2018 and 2019 are extrapolated for each age group assuming that the survival rates, the firm sizes and the number of start-ups linearly converge to their 2008-2017 average.[8] Similarly, the age profile of firm size and survival rate between age 6 and 15 for the years 2008 to 2017 are interpolated to obtain values per age bin that reflect trends consistent with the aggregate average values per age bin and year. The age profile of the number of firms older than 5 years is then simply obtained using the information on the interpolated yearly survival rate per age bin 6 to 15. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. This implies that the simulations should be considered as lower boundaries given that they do not take into account the impact of the crisis on firms older than 15. Finally, the different scenarios are simulated from 2020. The calculator allows analysis of bounce-back scenarios to capture the case in which the three margin would recover strongly, i.e. above the time series average, from 2021, for instance due to a policy intervention. See Appendix II for technicalities behind the interpolation extrapolation and creation of scenarios.

The start-up calculator allows also to adjust the simulations taking into consideration general equilibrium effects, i.e. potential employment reallocation towards surviving and older firms, which are driven by a lower wage rate caused by the decline in start-up employment. To this end the calculator is embedded in a standard heterogeneous firm model, which allows to connect the calculator with the literature on firm dynamics.[9] In models with firm heterogeneity, firms are distributed over different levels of productivity, unproductive firm exit the economy and are replaced by new entrants, while households consume and supply labour to firms. The interested reader can find in Appendix II the derivations formalizing the embedding of the calculator in a general equilibrium model with firm dynamics. When the COVID-19 pandemic hits the activity of start-ups and young firms, the general equilibrium reallocation mechanism dampens the effect. The disruption of start-up and young firm activities results in lower employment and a lower wage rate. Firms that remain in the market hire more labour partially absorbing the negative shock on employment. The magnitude of the equilibrium dampening effect depend on the labour supply and demand elasticities. In the EU start-up calculator, the elasticities are consistent with the literature and with the values adopted by the European Commission QUEST and RHOMOLO models. In particular, the labour supply elasticity is set at 0.25 and the labour demand elasticity at -0.1. These elasticities result in a dampening effect of 29% (see Appendix III).[10]

[7] The sectoral aggregation analysed reflects the classification available in Eurostat. That is, business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

[8] In the case of Bulgaria, Croatia, Poland and Slovakia, Eurostat data for the survival rate start in 2013. The short time series does not allow us to have 5 years to construct the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate are the same number.

[9] As a reference to the canonical model of firm heterogeneity see Hopenhayn (1993) and Hopenhayn and Rogerson (1995).

[10] The elasticities chosen result in a conservative dampening effect. When setting the elasticities at values more commonly used in the macroeconomic literature, such that for the labour supply elasticity and –0.246 for the labour demand elasticity (Lichter et al. (2015)), the dampening effect reduces to 20%. In light of the large range of elasticities discussed in the literature the calculator features easily changeable elasticities enabling for robustness checks.

4 Country analysis

4.1 EU start-up calculator: Bulgaria

4.1.1 Summary

- The COVID-19 crisis is likely to heavily affect young firms, leading to a decline in the start-up rate, higher exit of young firms, and lower growth of start-ups.
- According to the EU start-up calculator, these developments are likely to create substantial aggregate employment losses, of up to -2.6% in 2020. The cumulative employment loss for the period 2020-2030 could be up to 190,000.
- Effects are very persistent: full recovery may take more than a decade, even if start-up activity recovers to its pre-crisis level in one year.
- More than 60% of the aggregate employment loss is accounted for by the reduction of the survival rate and about 40% by the reduction in the number of start-ups and their growth potential. Policies targeted to support young firm survival and promote new firms' entry and scale up would seem to be the most effective. The outlook is improved if in 2021 there is a rapid increase in the number of firms entering the economy. i.e. the cumulative aggregate employment loss is reduced to 156,000.
- The Bulgarian service sector may be affected relatively strongly, as young firms are particularly important job creators in this sector. In all three sectors more than 60% of the job loss is due to a decline in the survival rate of young firms.

4.1.2 Business dynamism in Bulgaria

Before presenting the scenario analysis, we consider a number of statistics on the dynamism of Bulgarian firms, see Table I.

Table I. Descriptive statistics on the economy and sector dynamics of young firms - Bulgaria

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	12.2%	8.6%	8.4%	12.8%
survival rate	92%	88.2%	92%	92.2%	87.7%
share of young firms	36%	44.6%	34.6%	34%	46.2%
employment share of start-ups	2.5%	3.3%	1.6%	14.3%	4.2%
employment share of young firms	12%	21.4%	13.2%	1.8%	26%

Source: JRC, Eurostat, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2012 to 2017.

The statistics show that, when it comes to entry and exit of firms, the Bulgarian economy has a higher start-up rate than the EU average. An important share of job creation is attributed to start-ups and young firms, almost doubling the EU average. Over the sample, about 12% of firms exit and enter within a given year. Start-ups (firms of age zero) account for more than 3% of aggregate employment whereas firms up to age 5

together account for more than 21%.[11] When looking at the sectoral disaggregation, the service sector contributes to most of the business dynamic of the overall economy with a start-up rate of almost 13% and an employment share of start-ups above 4%.

Moreover, recent data provided by the Bulgarian National Statistical Institute shows an increasing contraction in the number of new businesses created since the beginning of the year with respect to the same period in 2019. In particular, the contraction, which shows already in February, it has sharply strengthened since the start of the COVID-19 pandemic and the ensuing hibernation of most of the economic activities. In particular, 47.3% less businesses were created in March, (when the COVID-19 pandemic started), 65.7% less in April, 39.7% less in May, in each case compared to the corresponding month of 2019. The decline in the registration of new firms improved during the summer months but it still shows a considerable contraction with respect the same period in 2019 (see Figure 5). These statistics show an important and persistent disruption of start-up activity due to the COVID-19 pandemic. This can have important repercussions for aggregate employment, especially if the number of start-ups does not recover quickly as Figure 5 seems to suggest.

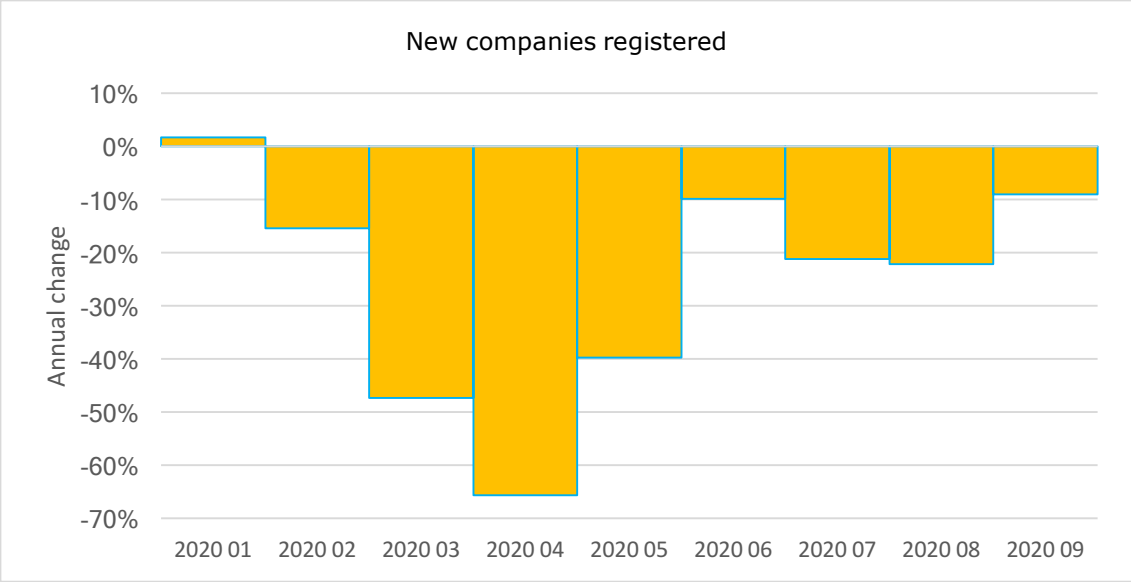


Figure 5. Annual change in the number of new companies registered in 2020 with respect to the same period in 2019 (percentage) - Bulgaria

Source: JRC, data from the Bulgarian National Statistical Institute (BNSI), 2020.

4.1.3 Scenario analysis

We consider a deterioration of the three margins described above. Specifically, we assume that the number of start-ups and the growth potential fall from the sample *averages* to the sample *minima* (which were reached in the years following the financial crisis of 2008), while the survival rate drops considerably[12], see Table II.[13] Moreover, we

[11] Table I also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

[12] In the case of Bulgaria, Eurostat data for the survival rate start in 2013. The short time series does not allow us to have 5 years to construct the 1-5 survival rate. As a consequence, the minimum, maximum and average value of the survival rate are the same number.

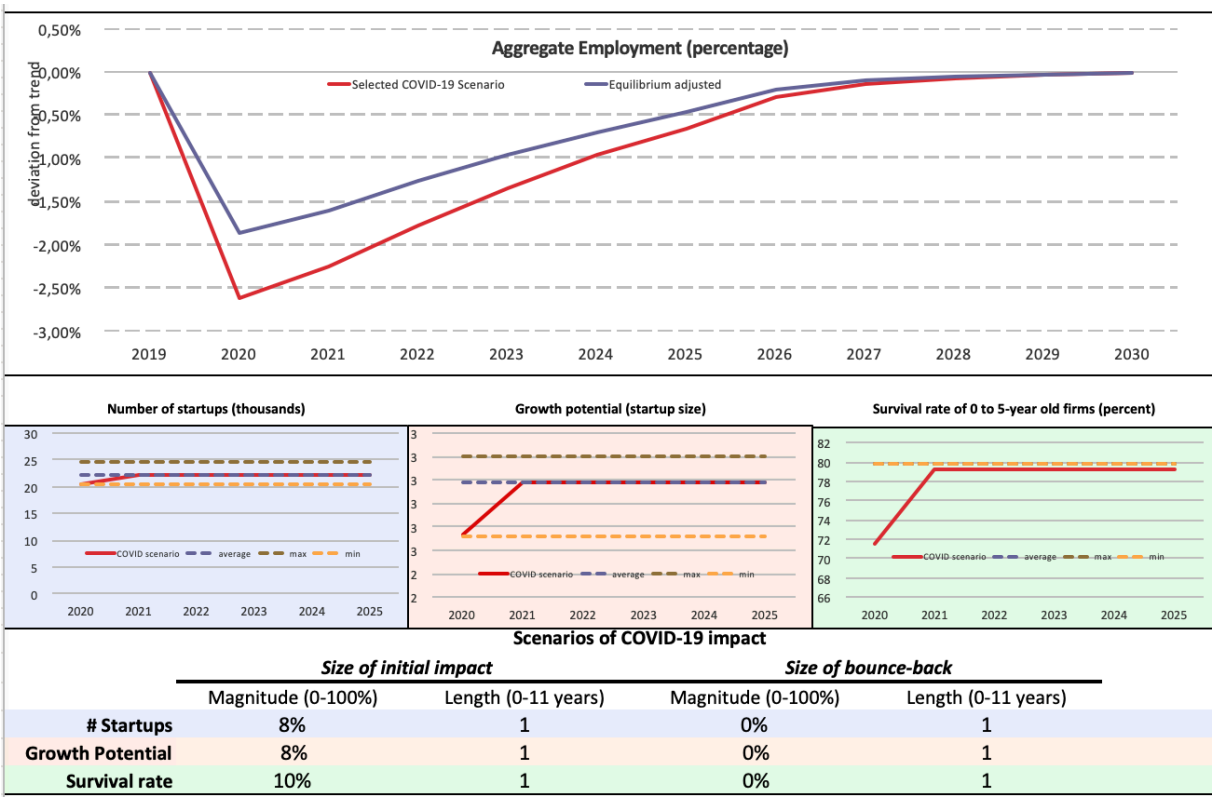
[13] Note that in Table II Industry, Manufacturing and Serving sector are set to their sample minima which happens to be the same for the number of start-ups. However, the COVID-19 crisis seems to have impacted particularly strongly the service sector imposing strict lockdown measures to sectors such as transport, tourism, and hospitality. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.

assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. The scenario is the one of a strong but short-lived crisis expecting that once the second wave is contained, the economic activity of start-ups and young firms will resume. This expectation seems to be consistent with the recent economic trend.

Table II. Scenario assumptions - Bulgaria

	All	Industry	Manufacturing	Services
# Start-ups	-8%	-8%	-8%	-8%
Growth potential	-8%	-4%	-4%	-10%
Survival rate	-10%	-10%	-10%	-10%

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.



	Size of initial impact		Size of bounce-back	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	8%	1	0%	1
Growth Potential	8%	1	0%	1
Survival rate	10%	1	0%	1

Figure 6. Scenario analysis for employment and the three margins of start-up activity - Bulgaria

Source: EU start-up calculator, Bulgaria, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration (for the survival rate it is arbitrarily assumed to be of -10%). The Business Demography data of Eurostat for Bulgaria are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Figure 6 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator. For 2020, the

calculator shows that the three margins together reduce aggregate employment by just over 2.6%. The recovery is slow: by 2026, aggregate employment is still more than 0.3% below the level it would have attained without the disruption of start-up activity. The employment loss, cumulated up to 2030 is 190,000. Accounting for equilibrium adjustments, aggregate effects are dampened by 29%, leaving a cumulative employment loss of about 136,000 (blue line in Figure 6). The decline in the survival rate accounts for about more than 60% of the effect. The number of start-ups and their growth potential account for about 20% each. These findings provide an important input for the policy discussion. The three different margins can be influenced by targeted policies. Potential employment benefits of policies targeted towards firm survival and to promote firm entry and scaling up seems high. However, the cost of different policy options needs to be taken into account.

Moreover, we consider how sectors may be affected differently. Table I shows that, compared to manufacturing and overall industry, firms in the service sector are somewhat more dynamic. This sector has higher start-up and exit rates, and a much higher employment share of start-ups and other young firms.

Figure 7 shows the results of the calculator for the three industries. The service sector shows a larger employment loss, even though the decline in the three margins assumed is not much stronger (Table II). This result is driven by the fact that the service sector is more dynamic in terms of entry and exit and therefore reliant on young firms to provide employment.

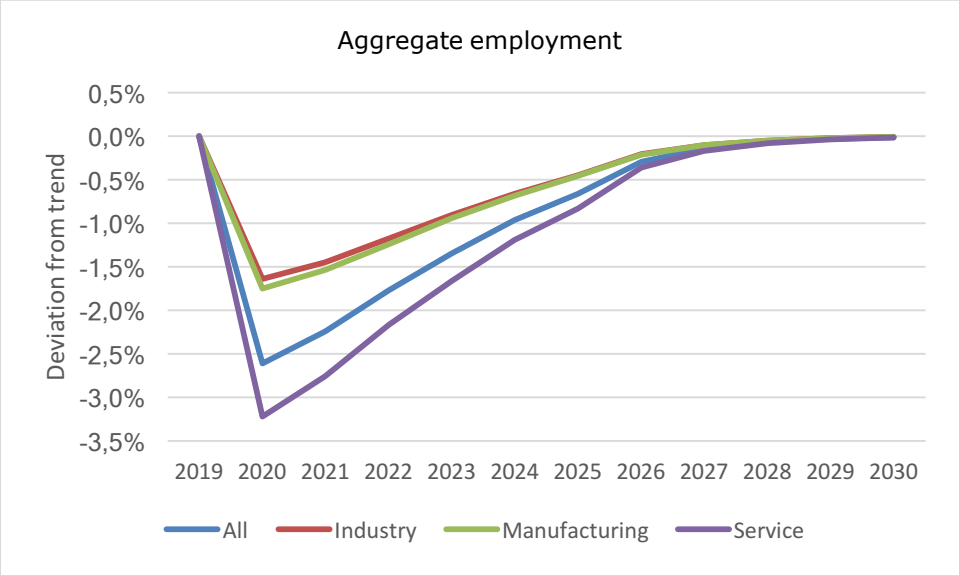


Figure 7. Sectors employment (not equilibrium adjusted) - Bulgaria

Source: JRC, EU start-up calculator, Bulgaria, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration (for the survival rate it is arbitrarily assumed to be of -10%). The Business Demography data of Eurostat for Bulgaria are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

Table III. Share of aggregate employment loss accounted for by the margins - Bulgaria

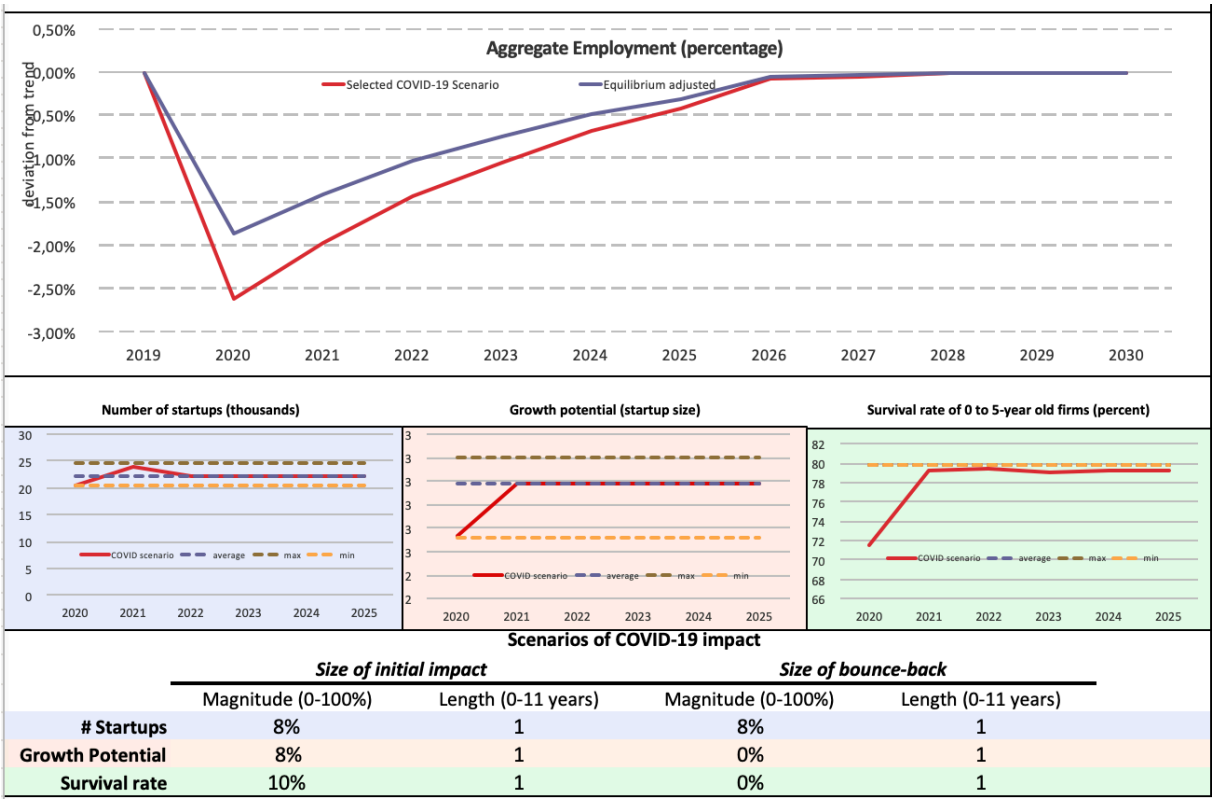
	All	Industry	Manufacturing	Services
Cumulative employment loss	190 k	41 k	37 k	138 k
# Start-ups	18%	20%	18%	17%
Growth potential	18%	9%	10%	21%
Survival rate	64%	71%	72%	62%

Source: JRC, EU start-up calculator, Bulgaria, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Hence, a disruption to start-ups and other young firms affects the service sector relatively strongly causing a loss of aggregate employment of more than 138,000 jobs (Table III). In all the three sectors more than 60% of the job loss is attributed to the decline in the survival rate of young firms, in the industry and manufacturing sector this margin explains more than 70%. The decline in the number of start-ups accounts for about 20% across the three sectors. In the industry and service sector the decline of the growth potential explains a marginal part of the overall employment loss as a consequence of a small magnitude of the shock affecting this margin. These considerations are indicative that policy targeted to support firms to tackle survival challenges and support entry could have a significant effect in mitigating the impact that the COVID-19 pandemic will have on aggregate employment across sectors.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of a postponement of start-up decisions with more firm entry in 2021 especially if supported by specific policies targeted to start-ups that could reduce the entry barriers, promote innovation and relax financial constraints. The optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 8 where, after the initial negative shock, the number of start-ups is increased in 2021 to the maximum level registered in the time series. After an initial sharp decline in aggregate employment, the increased number of start-ups entering in 2021 causes an improvement of the employment trend and a lower cumulative job loss totalling to about 156,000. Thanks to the better outlook aggregate employment reaches its pre COVID-19 level by 2026. This is due to the fact that the number of start-ups account for an important share of the impact on aggregate employment, i.e. about 20%, of the total effect on employment (see Table III).



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	8%	1	8%	1
Growth Potential	8%	1	0%	1
Survival rate	10%	1	0%	1

Figure 8. Bounce-back scenario in the number of firms, results for aggregate employment - Bulgaria

Source: EU start-up calculator, Bulgaria, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of the duration of one year (for the survival rate it is arbitrarily assumed to be of -10%). The Business Demography data of Eurostat for Bulgaria are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate) The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal to the sample *maximum* and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

4.2 EU start-up calculator: Croatia

4.2.1 Summary

- The COVID-19 crisis is likely to heavily affect young firms, leading to a decline in the start-up rate, a higher exit of young firms, and lower growth of start-ups.
- According to the EU Start-up Calculator, these developments are likely to create an important aggregate employment loss, of up to 5.6% in 2020. The cumulative employment loss for the period 2020-2030 could be up to 237,000.
- Effects are persistent: full recovery may take a decade, even if start-up activity recovers to its pre-crisis level in one year.
- The decline in the survival rate number accounts for more than 60% of the employment loss, while the decline in the growth potential and in the number of start-ups for about 19%. Policies targeted to reduce exit of young firms would seem to be the most effective in Croatia. The outlook is significantly improved if in 2021 there is a rapid increase in the number of firms entering the economy, i.e. the cumulative aggregate employment loss is reduced to 188,000.

- The Croatian service sector may be affected relatively strongly, as young firms are particularly important job creators in this sector. In all three sectors more than 50% of the job loss is due to a decline in the survival rate of young firms.

4.2.2 Business dynamism in Croatia

Before presenting the scenario analysis, we consider a number of statistics on the dynamism of Croatian firms, see Table IV. The statistics show that, when it comes to firms' entry and exit, Croatia is dynamic and relies on start-ups for job creation. Over the sample, 11.5% of firms exit within a given year, whereas the start-up rate is about 12 %. Both values are higher than the EU average. Start-ups (firms of age zero) account for about 3.6% of aggregate employment whereas firms up to age 5 together account for almost 16%, which is higher than the EU average of 12%. The importance of start-ups and young firms is evident in the service sector where young firms account for more than 43% of the total number of active firms and for more than 18% of total employment, whereas in the industry and manufacturing sectors young firms account for about 2% of employment.[14] As a consequence, we expect that effect of the disruption of start-up activity due to COVID-19 will be particularly high in the service sector.

Table IV. Descriptive statistics on the economy and sector dynamics of young firms - Croatia

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	12.1%	9.5%	9.4%	12.7%
survival rate	92%	88.5%	90%	89.8%	88.4%
share of young firms	36%	39.3%	35.9%	35.9%	43.3%
employment share of start-ups	2.5%	3.6%	2%	2.2%	4.2%
employment share of young firms	12%	15.9%	10.6%	11.8%	18.1%

Source: JRC, Eurostat, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat –i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2012 to 2017.

4.2.3 Scenario analysis

We consider a deterioration of the three margins described above, in which we assume that the number of start-ups, the survival rate, and the growth potential fall from the sample *averages* to the sample *minima* (which were reached in the years following the financial crisis of 2008), while the survival rate drops considerably[15], see Table V.[16] Moreover, we assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. The scenario is the one

[14] Table IV also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

[15] In the case of Croatia, Eurostat data for the survival rate start in 2013. The short time series does not allow us to have 5 years to construct the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate are the same number.

[16] Note that in Table V Industry, Manufacturing and Serving sector are set to their sample *minima* for the number of start-up and growth potential and set to -20% for the survival rate across sectors. However, the COVID-19 crisis seems to have impacted particularly strongly the service sector imposing strict lockdown measures to sectors such as transport, tourism, and hospitality. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.

of a strong but short-lived crisis expecting that once the COVID-19 crisis is tackled, the economic activity of start-ups and young firms will resume.

Table V. Scenario assumptions - Croatia

	All	Industry	Manufacturing	Services
# Start-ups	-20%	-30%	-30%	-25%
Growth potential	-20%	-35%	-35%	-20%
Survival rate	-20%	-20%	-20%	-20%

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Figure 9 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator. For 2020, the calculator shows that the three margins together reduce aggregate employment by more than 5.6%. The recovery is slow: by 2026, aggregate employment is about 1% lower than the level it would have attained without the disruption of start-up activity. The employment loss, cumulated up to 2030 is 237,000. Accounting for equilibrium adjustments, aggregate effects are dampened by 29%, leaving a cumulative employment loss of about 169,000.

Despite symmetric shocks across the margins (i.e. all the three margins decline by 20% in 2020), the decline in the survival rate accounts for about 62% of the effect. The decline in the number of start-ups and in the growth potential account for about 19% each. These findings provide an important input for the policy discussion. The three different margins can be influenced by targeted policies. Potential employment benefits of policies targeted towards reducing firms exit suggest to be highest. However, the cost of different policy options must be considered.

Moreover, we consider how sectors may be affected differently. Table IV shows that, compared to manufacturing and overall industry, firms in the service sector are more dynamic: This sector has much higher start-up and exit rates, and a much higher employment share of start-ups and other young firms (Table IV).

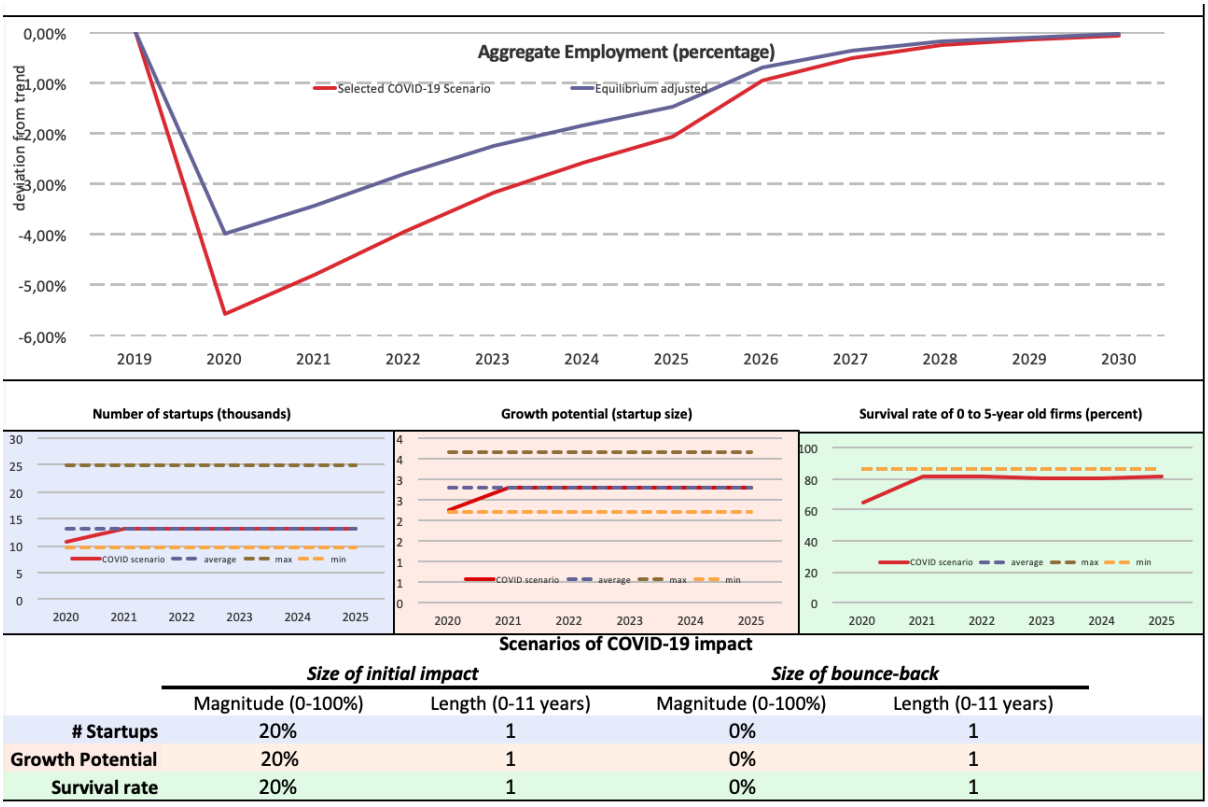
Figure 10 shows the results of the calculator for the three industries. The service sector shows a larger employment loss than the one occurred in the manufacturing and industry sector even if the shocks to this sector as somewhat smaller in magnitude. This result is driven by the fact that the service sector has a high business dynamism and therefore reliant on start-ups and young firms to provide employment. A disruption to start-ups and other young firms affects the service sector causes a loss of aggregate employment of more than 165,000 jobs (Table VI). In all three sectors the decline in the survival rate accounts for more than 50% of the effect. This is indicative that policy targeted to support firm survival could have a significant effect in mitigating the impact that the COVID-19 pandemic will have on aggregate employment, especially in the service sector.

Table VI. Share of aggregate employment loss accounted for by the margins - Croatia

	All	Industry	Manufacturing	Services
Cumulative employment loss	237 k	59 k	55 k	165 k
# Start-ups	19%	23%	23%	24%
Growth potential	19%	27%	27%	19%
Survival rate	62%	50%	50%	57%

Source: JRC, EU start-up calculator, Croatia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	20%	1	0%	1
Growth Potential	20%	1	0%	1
Survival rate	20%	1	0%	1

Figure 9. Scenario analysis for employment and the three margins of start-up activity - Croatia

Source: EU start-up calculator, Croatia, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of the duration of one year (for the survival rate it is arbitrarily assumed to be of -20%). The Business Demography data of Eurostat for Croatia are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

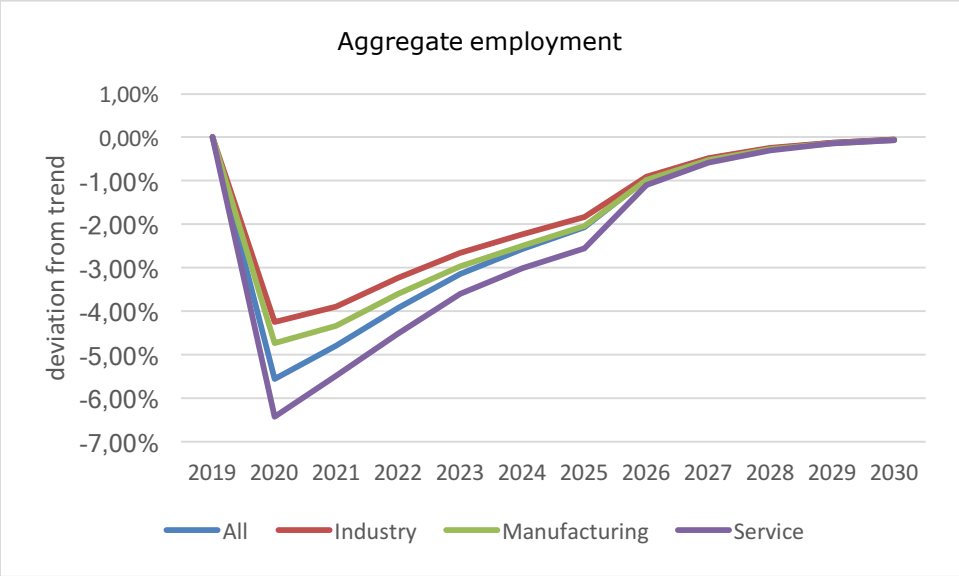


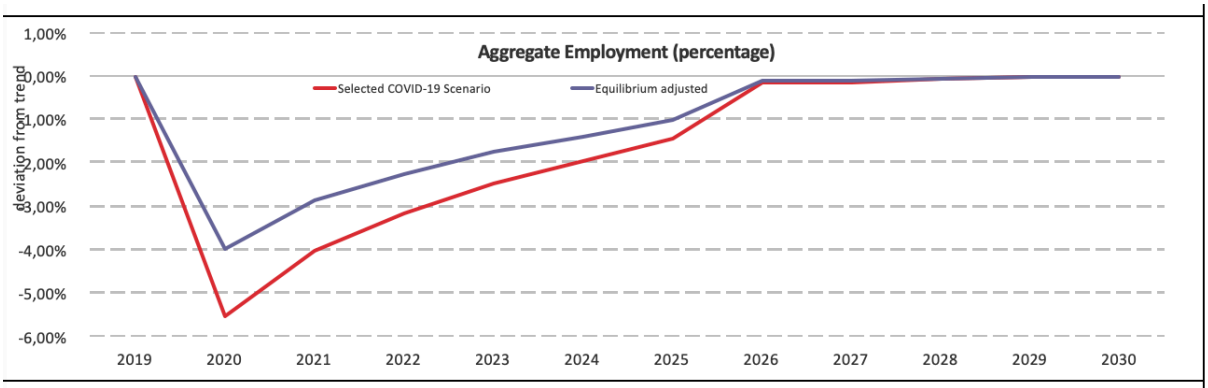
Figure 10. Sectors employment (not equilibrium adjusted) - Croatia

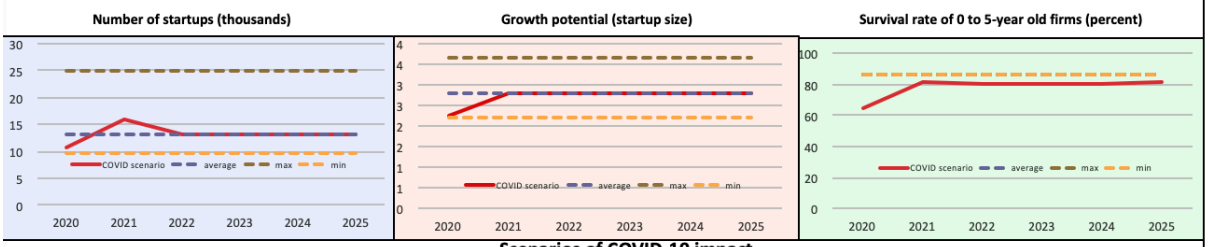
Source: JRC, EU start-up calculator, Croatia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration (for the survival rate it is arbitrarily assumed to be of -20%). The Business Demography data of Eurostat for Croatia are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of a postponement of start-up decisions with more firm entry in 2021, which could be stimulated by policies supporting entrants and the creation of new business ideas that could lead to radical innovations. The optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 11 where, after the initial negative shock, the number of start-ups is increased in 2021 to a level corresponding to the 2020 drop registered in the time series. After an initial sharp decline in aggregate employment, the increased number of start-ups entering in 2021 causes an improvement of the employment trend and a lower cumulative job loss totalling to about 188,000. Moreover, already in 2021 the aggregate employment loss is reduced to only 4%. Tre pre COVID-19 level of employment is reached by 2026.





Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	20%	1	20%	1
Growth Potential	20%	1	0%	1
Survival rate	20%	1	0%	1

Figure 11. Bounce-back scenario in the number of firms, results for aggregate employment - Croatia

Source: EU start-up calculator, Croatia, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of the duration of one year (for the survival rate it is arbitrarily assumed to be of -20%). The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal to 20% and last one year. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

4.3 EU start-up calculator: Czechia

4.3.1 Summary

- The COVID-19 crisis is likely to negatively affect young firms, leading to a decline in the start-up rate, a higher exit of young firms, and lower growth of start-ups.
- According to the EU start-up calculator, these developments are likely to create aggregate employment losses, of up to 1.8% in 2020. The cumulative employment loss for the period 2020-2030 could be up to 241,000.
- Effects are somewhat persistent: full recovery may take about a decade, even if start-up activity recovers to its pre-crisis level in one year.
- About 43% of the aggregate employment loss is accounted for by a reduction of the survival rate, about 35% by the reduction in the number of start-ups and about 22% by the reduction in the growth potential. A policy mix targeted to reduce exit of young firms, incentivise entry and scale-ups would seem to be the most effective. The outlook is significantly improved if in 2021 there is a rapid increase in the number of firms entering the economy. i.e. the cumulative aggregate employment loss is reduced to 195,000.

- The Czech service sector is affected more strongly than the industry and manufacturing sectors, as young firms are important job creators in this sector. This also in the case of symmetric shocks across sectors.

4.3.2 Business dynamism in Czechia

Before presenting the scenario analysis, we consider a number of statistics on the dynamism of Czech firms, see Table VII. The statistics show that the Czech economy has a slightly higher firm entry and exit rates compared to the average EU one, especially in the service sector which seems to be characterized by a large share of young firms. Over the sample about 11% of firms exit within a given year, whereas the start-up rate is 9.5%. These values are above the EU average of 9.2% and 8% for entry and exit rate, respectively. However, the employment share of Czech start-ups and young firms is lower than the EU average. Start-ups (firms of age zero) account for about 1.7% of aggregate employment whereas firms up to age 5 together account for 11.5% while EU average is 12%.[17]

Table VII. Descriptive statistics on the economy and sector dynamics of young firms - Czechia

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	9.5%	7.2%	7.1%	10.2%
survival rate	92%	89.8%	93%	92.8%	88.7%
share of young firms	36%	38.4%	29.9%	29.8%	41%
employment share of start-ups	2.5%	1.7%	0.8%	0.7%	2.3%
employment share of young firms	12%	11.5%	5.9%	5.4%	15.4%

Source: JRC, Eurostat, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2008 to 2017.

4.3.3 Scenario analysis

We consider a deterioration of the three margins described above. Specifically, we assume that the number of start-ups, and the growth potential and the survival rate fall from the sample *averages* to the sample *minima* (which were reached in the years following the financial crisis of 2008), see Table VIII.[18] Moreover, we assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. Hence, the scenario is the one of a strong but short-lived crisis expecting that once the pandemic is under control, the economic activity of start-ups and young firms will resume.

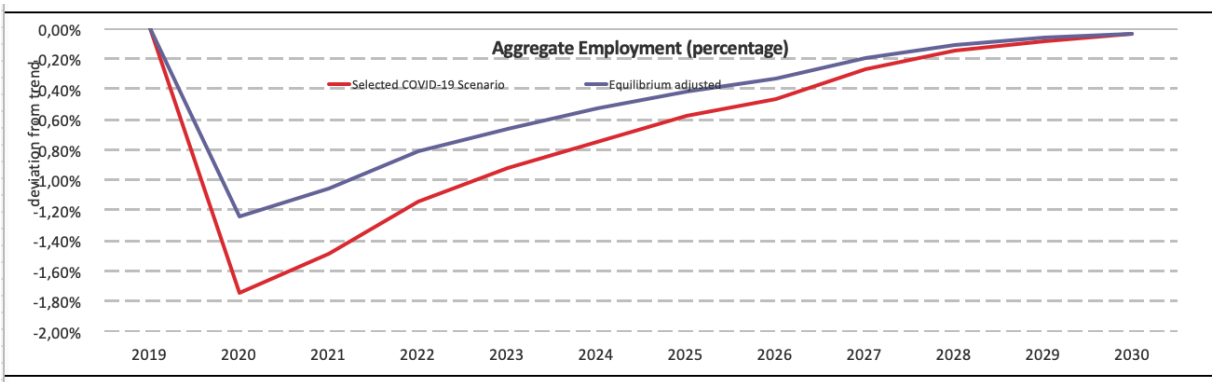
[17] Table VII also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

[18] Note that in Table VIII Industry, Manufacturing and Serving sector are set to their sample *minima* which happens to be the same for the growth potential. The COVID-19 crisis seems to have impacted particularly strongly the service sector imposing strict lockdown measures to sectors such as transport, tourism, and hospitality. This is partly reflected by the sample *minima* for the number of start-ups and survival rate. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.

Table VIII. Scenario assumptions -Czechia

	All	Industry	Manufacturing	Services
# Start-ups	-40%	-30%	-30%	-40%
Growth potential	-25%	-25%	-25%	-25%
Survival rate	-15%	-10%	-8%	-15%

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	40%	1	0%	1
Growth Potential	25%	1	0%	1
Survival rate	15%	1	0%	1

Figure 12. Scenario analysis for employment and the three margins of start-up activity - Czechia

Source: EU start-up calculator, Czechia, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. The Business Demography data of Eurostat for Czechia are available from 2008 to 2017. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Figure 12 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator. For 2020, the calculator shows that the three margins together reduce aggregate employment by about 1.8%. The recovery is slow: only by 2030 does aggregate employment reach the level it would have attained without the disruption of start-up activity. The employment loss, cumulated up to 2030 is 240,790. Accounting for equilibrium adjustments, aggregate

effects are dampened by 29%, leaving a cumulative employment loss of about 171,990. The decline in the survival rate accounts for more than 40% of the effect, although the magnitude of the shock to this margin is the lowest. The number of start-ups accounts for 35% and the growth potential for roughly 22%. These findings provide an important input for the policy discussion. The three different margins can be influenced by targeted policies. Potential employment benefits of policies targeted towards firm survival suggest to be highest. At the same time policies to reduce entry barriers and increase young firm growth potential could support a faster recovery. However, the cost of different policy options needs to be taken into account.

Moreover, we consider how sectors may be affected differently. Table VII shows that, compared to manufacturing and overall industry, firms in the service sector are relatively dynamic: This sector has much higher start-up and exit rates, and a much higher employment share of start-ups and other young firms.

Figure 13 shows the results of the calculator for the three sectors, namely industry, manufacturing and service sector. The service sector shows a much larger employment loss, partly due to larger shocks and mostly driven by the fact that the service sector has a higher turnover rate and is more reliant on young firms to provide employment. Hence, a disruption to start-ups and other young firms affects the service sector stronger than the other sectors causing a loss of aggregate employment of more than 352,000 jobs (Table IX). In all the three sectors the decline in the number of start-ups account for more than 30% while the survival rate accounts between 35% (manufacturing sector) and 43% (service sector) of the employment loss. This is indicative that policies targeted to incentivize firm entry, scale-up and reduce firm exit could all have a significant effect in mitigating the impact that the COVID-19 pandemic will have on aggregate employment.

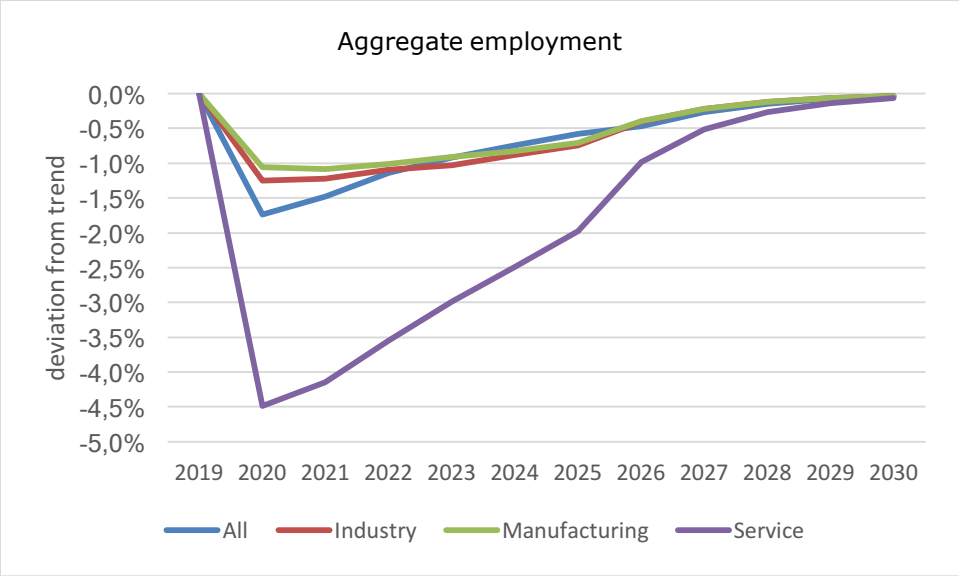


Figure 13. Sectors employment (not equilibrium adjusted) - Czechia

Source: EU start-up calculator, Czechia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

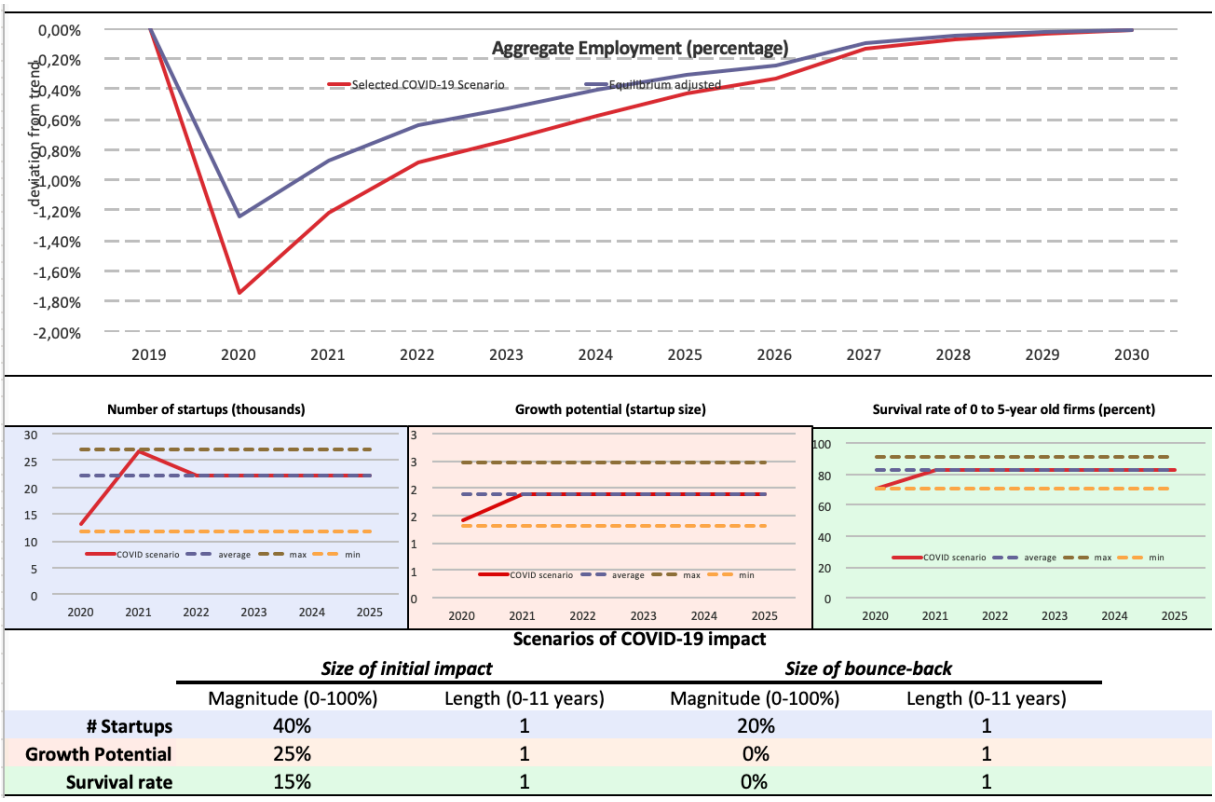
Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration. The Business Demography data of Eurostat for Czechia are available from 2008 to 2017. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

Table IX. Share of aggregate employment loss accounted for by the margins - Czechia

	All	Industry	Manufacturing	Services
Cumulative employment loss	241 k	92 k	32 k	352 k
# Start-ups	35%	33%	35%	35%
Growth potential	22%	27%	30%	22%
Survival rate	43%	40%	35%	43%

Source: JRC, EU start-up calculator, Czechia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	40%	1	20%	1
Growth Potential	25%	1	0%	1
Survival rate	15%	1	0%	1

Figure 14. Bounce-back scenario in the number of firms, results for aggregate employment - Czechia

Source: EU start-up calculator, Czechia, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. The Business Demography data of Eurostat for Czechia are available from 2008 to 2017. The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal in magnitude to the sample *maxima*. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of delayed entry in 2021 and it should be supported by policies promoting and facilitating firm entry. The optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 14 where, after the initial negative shock, the number of start-ups is increased in 2021 to reach the sample *maximum*. After an initial sharp decline in aggregate employment, the increased number of start-ups entering in 2021 causes a speedy recovery of aggregate employment and a lower cumulative job loss totalling to about 195,000.

4.4 EU start-up calculator: Luxemburg

4.4.1 Summary

- The COVID-19 crisis is likely to heavily affect young firms, leading to a decline in the start-up rate and lower growth of start-ups.
- According to the EU start-up calculator, these developments are likely to create aggregate employment losses, of up to 0.25% of employment trend in 2020. The cumulative employment loss for the period 2020-2030 could be up to 5,600. Hence, for Luxemburg the effects of COVID-19 on employment are relatively modest.
- Effects are somewhat persistent: full recovery may take about a decade, even if start-up activity recovers to its pre-crisis level in one year.
- The decline in the number of start-ups accounts for 62%, the growth potential for about 23% and the survival rate for about 15% of the aggregate employment loss. Policies targeted to support firm scalability and incentivise entry would seem to be the most effective in Luxemburg. The outlook is significantly improved if in 2021 there is a rapid increase in the number of firms entering the economy, i.e. the cumulative aggregate employment loss is reduced to 2,100 jobs and by 2026 the employment would surpass the level that it would have attained without the COVID-19 crisis.
- The service sector may be affected strongly, as young firms are important job creators in this sector. This also in the case of mild shocks to start-up activity.

4.4.2 Business dynamism in Luxemburg

As before, we consider a number of statistics on the dynamism of firms in Luxemburg, see Table X. The statistics show that in terms of firms' entry and exit the economy is similar to the EU average. Over the sample about 8% of firms exit within a given year, whereas the start-up rate reaches almost 10%. Start-ups (firms of age zero) account for 1.8% of aggregate employment whereas firms up to age 5 together account for about 11.8%.[19] Nonetheless, young firms represent 41.4% of the population of active firms, which is higher than the EU average of about 36%.

[19] Table XI also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

Table X. Descriptive statistics on the economy and sector dynamics of young firms - Luxemburg

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	9.7%	4.5%	4.4%	10.1%
survival rate	92%	92.2%	94.4%	94.6%	92%
share of young firms	36%	41.4%	22.7%	28.2%	42.8%
employment share of start-ups	2.5%	1.8%	0.3%	0.3%	2%
employment share of young firms	12%	11.8%	2.6%	1.9%	13%

Source: JRC, Eurostat, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2008 to 2017.

4.4.3 Scenario analysis

We consider a deterioration of the three margins described above. Specifically, we assume that the number of start-ups, the growth potential and the survival rate of young firms all fall from the sample *averages* to the sample *minima* (which were reached in the years following the financial crisis of 2008), see Table XI.[20] Moreover, we assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. As for the previous countries, our benchmark scenario assumes a one-off and short-lived negative effect of the Corona-crisis on start-up activities, assuming that once the pandemic is under control, the economic activity of start-ups and young firms will resume.

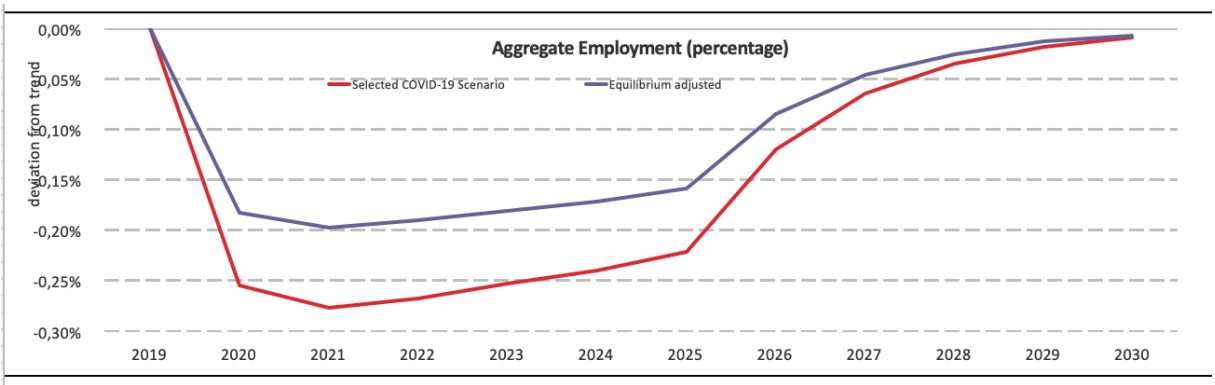
Table XI. Scenario assumptions - Luxemburg

	All	Industry	Manufacturing	Services
# Start-ups	-8%	-25%	-20%	-8%
Growth potential	-3%	-20%	-45%	-4%
Survival rate	-0.6%	-4%	-6%	-0.9%

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

[20] Note that in Table XI Industry, Manufacturing are hit by large shocks with respect to the service sector. This is due to the low number of observations in the industry and manufacturing sectors which increase volatility. With this caveat in mind, the COVID-19 crisis seems to have impacted particularly strongly the service sector imposing strict lockdown measures to sectors such as transport, tourism, and hospitality. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.

Figure 15 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator.[21] For 2020, the calculator shows that the three margins together reduce aggregate employment by only 0.25%. Nevertheless, full recovery of aggregate employment to its pre-COVID level may take up to a decade. The employment loss, cumulated up to 2030 is 5,600. Accounting for equilibrium adjustments, aggregate effects are dampened by 29%, leaving a cumulative employment loss of about 4,000. The decline in the number of start-ups account for 62% of the negative employment effect, while the decline in the growth potential accounts for about 23%. Instead, the survival rate has only a marginal impact of 15%: the low magnitude of the shock to this margin reveals that exit rate does not fluctuate much in Luxemburg. As a consequence, it has only a minor impact on aggregate employment. These findings provide an important input for the policy discussion. The different margins can be influenced by targeted policies. Potential employment benefits of policies targeted towards firm scaling-up, entry of high-potential start-ups, and ease entry suggest to be highest. At the same time policies to reduce entry barriers could support a faster recovery (see also Figure 17 which simulates a bounce-back scenario). However, the cost of different policy options needs to be taken into account.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	8%	1	0%	1
Growth Potential	3%	1	0%	1
Survival rate	1%	1	0%	1

Figure 15. Scenario analysis for employment and the three margins of start-up activity - Luxemburg

Source: EU start-up calculator, Luxemburg, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

[21] Note that the shock on the survival rate amount to 0.6% is equivalent to set the survival rate to its sample *minima* during the period 2008-2017. Hence, firm exit seems to be somewhat constant in Luxemburg and not so sensitive to crisis.

Moreover, we consider how sectors may be affected differently. Table X shows that, compared to manufacturing and overall industry, firms in the service sector are more dynamic. This sector has a much higher start-up rate, and a much higher employment share of start-ups and other young firms.

Figure 16 shows the results of the calculator for the three industries. Upon impact, all three sectors react to the shock with the manufacturing sector displaying the larger negative impact. Recalling that the shocks applied to the industry and especially the manufacturing sectors are much larger than the ones applied to the service sector, it is interesting to note how strongly the employment in the service sector reacts. This result is driven by the fact that the service sector is more dynamic and therefore reliant on young firms to provide employment. Hence, a disruption to start-ups and other young firms affects the service sector relatively strongly causing a loss of aggregate employment of more than 5,000 jobs (Table XII). The decline in all the three margins seems to play an important role in explaining the employment loss (Table XII). The number of start-ups accounts from 23% (manufacturing) to 53% (service sector), the growth potential accounts from 27% (service sector) to 50% (manufacturing) and the survival rate from 20% (service sector) to 27% (manufacturing). This is indicative that policy targeted to incentivize firm entry, scalability and survival could have a significant effect in mitigating the impact that the COVID-19 pandemic will have on aggregate employment in Luxemburg.

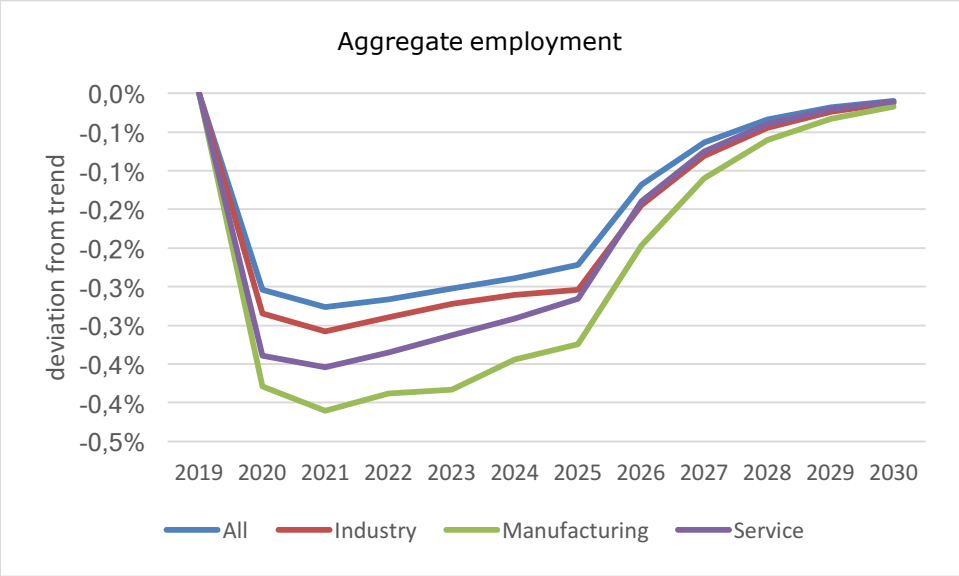


Figure 16. Sectors employment (not equilibrium adjusted) - Luxemburg

Source: JRC, EU start-up calculator, Luxemburg, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

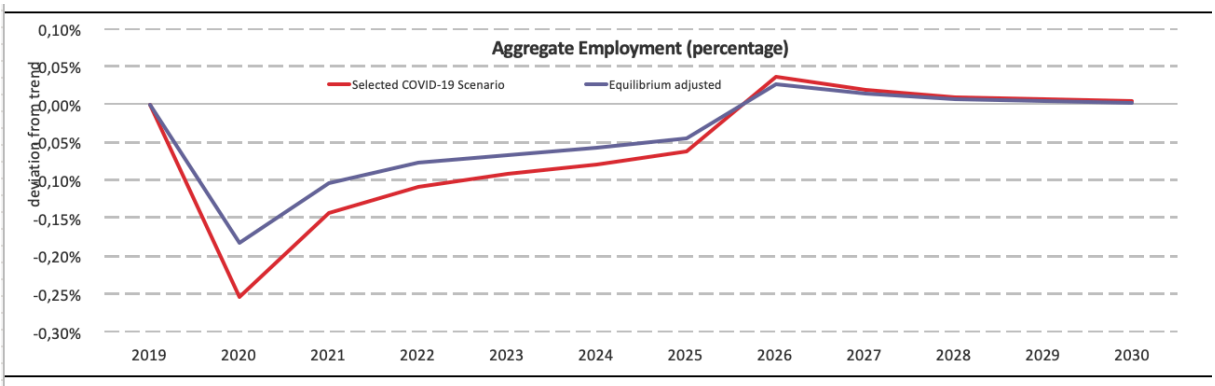
Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

Table XII. Share of aggregate employment loss accounted for by the margins - Luxemburg

	All	Industry	Manufacturing	Services
Cumulative employment loss	5.6 k	0.7 k	0.9 k	5.1 k
# Start-ups	62%	41%	23%	53%
Growth potential	23%	33%	50%	27%
Survival rate	15%	26%	27%	20%

Source: JRC, EU start-up calculator, Luxemburg, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	8%	1	8%	1
Growth Potential	3%	1	0%	1
Survival rate	1%	1	0%	1

Figure 17. Bounce-back scenario in the number of firms, results for aggregate employment - Luxemburg

Source: EU start-up calculator, Luxemburg, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal to the sample *maximum* and last one year. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of a postponement of start-up decisions with more firm entry in 2021, especially if stimulated by policies targeted to support the creation of new firms and innovative ideas. The

optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 17 where, after the initial negative shock, the number of start-ups is increased in 2021 to the *maximum* level registered in the time series. After an initial decline in aggregate employment, the increased number of start-ups entering in 2021 causes a speedy recovery of aggregate employment and a lower cumulative job loss during the period 2020-2030 totalling to about 2,100. Thanks to this enhanced firm entry aggregate employment surpasses its pre COVID-19 trend by 2026.

4.5 EU start-up calculator: Netherlands

4.5.1 Summary

- The COVID-19 crisis is likely to heavily affect young firms, leading to a decline in the start-up rate, a higher exit of young firms, and lower growth of start-ups.
- According to the EU Start-up Calculator, these developments are likely to create aggregate employment losses, of up to almost 1.4% in 2021. The cumulative employment loss for the period 2020-2030 could be up to 462,000.
- Effects are persistent showing a U-shaped path for aggregate employment: full recovery may take a decade.
- The decline in the number of start-ups accounts for about 43% of the employment loss and the decline of the growth potential of start-ups for about 52%. A holistic approach to policies targeted to incentivise entry and productivity of new firms would seem to be the most effective in the Netherlands. The outlook is significantly improved if in 2021 there is a rapid increase in the number of firms entering the economy, i.e. the cumulative aggregate employment loss is reduced to 203,000 and aggregate employment surpasses its pre-COVID level by 2026.
- The Dutch service sector may be affected particularly strongly, as young firms are particularly important job creators in this sector.

4.5.2 Business dynamism in the Netherlands

Before presenting the scenario analysis, we consider a number of statistics on the dynamism of firms in the Netherlands, see Table XIII. The statistics show that, when it comes to firms' entry and exit, the Dutch economy is somewhat in line with the EU average, and relies importantly on start-ups for job creation. Over the sample, about 10% of firms enter and exit within a given year. Start-ups (firms of age zero) account for about 2.5% of aggregate employment (as the EU average). Firms up to age 5 together account for more than 20% of aggregate employment (while the EU average settles at 12%).

The importance of start-ups and young firms is particularly evident in the service sector rather than in the industry and manufacturing sector. In fact, in the service sector young firms account for about 40% of the total number of active firms and for more than 23% of total employment (Table XIII).[22] Hence, it has to be expected that this sector will be most strongly hit by a disruption of start-up activities also when shocks across sectors are symmetric.

[22] Table XIII also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

Table XIII. Descriptive statistics on the economy and sector dynamics of young firms - Netherlands

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	9.8%	6.5%	6.2%	10.3%
survival rate	92%	90.5%	93.2%	93.4%	90.4%
share of young firms	36%	38.2%	28.7%	28%	39.5%
employment share of start-ups	2.5%	2.5%	1.4%	1.2%	2.7%
employment share of young firms	12%	21.9%	13.6%	12%	23.5%

Source: JRC, Eurostat, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2008 to 2017.

Nevertheless, the COVID-19 pandemic seems to have hit only marginally the creation of new companies in the Netherland. StatLine, the database of Statistics Netherlands, shows that in the first quarter of 2020 the number of new firms registered increased by 12.9% and only in the second quarter it shows a slight contraction of 3.7%, in each case compared to the first and second quarter of 2019. Furthermore, data from the Dutch Chamber of Commerce shows that the number of newly formed companies has declined by 1.82% between January and August 2020 with respect the same period in 2019. This highlights a persistence in the negative trend of new firm entry during the summer months.[23]

4.5.3 Scenario analysis

As for the previous countries analysed, we consider a deterioration of the three margins described above. Specifically, we assume that the number of start-ups, the survival rate, and the growth potential all fall from the sample *averages* to the sample *minima* (which were reached in the years following the financial crisis of 2008), see Table XIV.[24] Moreover, we assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. The scenario is one of a strong but short-lived crisis expecting that once the COVID-19 pandemic will be tackled, the economic activity of start-ups and young firms will resume.

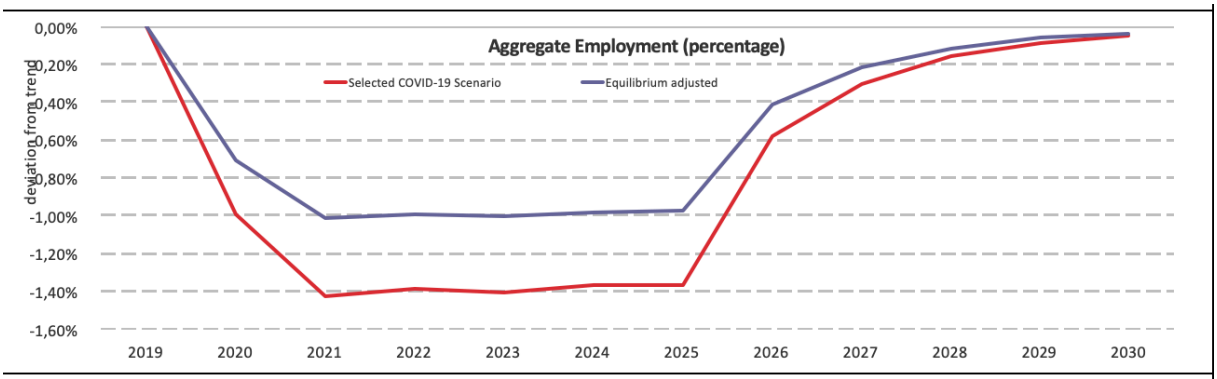
[23] StatLine data are available at https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83148NED/table?dl=4041A while the data from the Dutch Chamber of Commerce can be extracted from https://www.kvk.nl/download/KVK_Bedrijvendynamiek_januari_tot_en_met_augustus_2020_tcm109-492408.pdf .

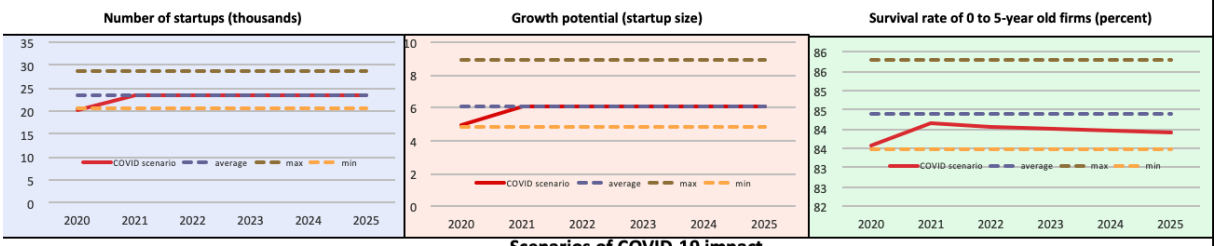
[24] Note that in Table XIV industry, manufacturing and service sector are set to their sample *minima* which results in larger shocks to manufacturing and industry. However, the COVID-19 crisis seems to have impacted more the service sector with reduced activities in sectors such as transport, tourism, and hospitality. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.

Table XIV. Scenario assumptions - Netherlands

	All	Industry	Manufacturing	Services
# Start-ups	-15%	-14%	-14%	-13%
Growth potential	-18%	-30%	-30%	-25%
Survival rate	-0.5%	-0.5%	-0.7%	-0.5%

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.





Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	15%	1	0%	1
Growth Potential	18%	1	0%	1
Survival rate	1%	1	0%	1

Figure 18. Scenario analysis for employment and the three margins of start-up activity - Netherlands

Source: EU start-up calculator, Netherlands, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Figure 18 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator. The shocks results in a U-shaped path for aggregate employment in the period 2020-2030. For 2020, the calculator shows that the three margins together reduce aggregate employment by 1% and by 1.4% between 2021 and 2025. The recovery is slow: only by 2030, aggregate employment is reaching the level it would have attained without the disruption of start-up activity. The employment loss, cumulated up to 2030 is 462,000. Accounting for

equilibrium adjustments, aggregate effects are dampened by 29%, leaving a cumulative employment loss of about 330,000. The decline in the number of start-ups accounts for about 43% of the effect and the growth potential for about 35%. This leaves only a marginal role played by the survival rate, also due to a shock applied that is small in magnitude. Nevertheless, these findings provide an important input for the policy discussion. Potential employment benefits of policies targeted towards firm scaling up and entry suggest to be highest. However, the cost of different policy options needs to be taken into account.

Moreover, we consider how sectors may be affected differently. Table XIII shows that, compared to manufacturing and overall industry, firms in the service sector are more dynamic. This sector has much higher start-up rate, and a much higher employment share of start-ups and other young firms.

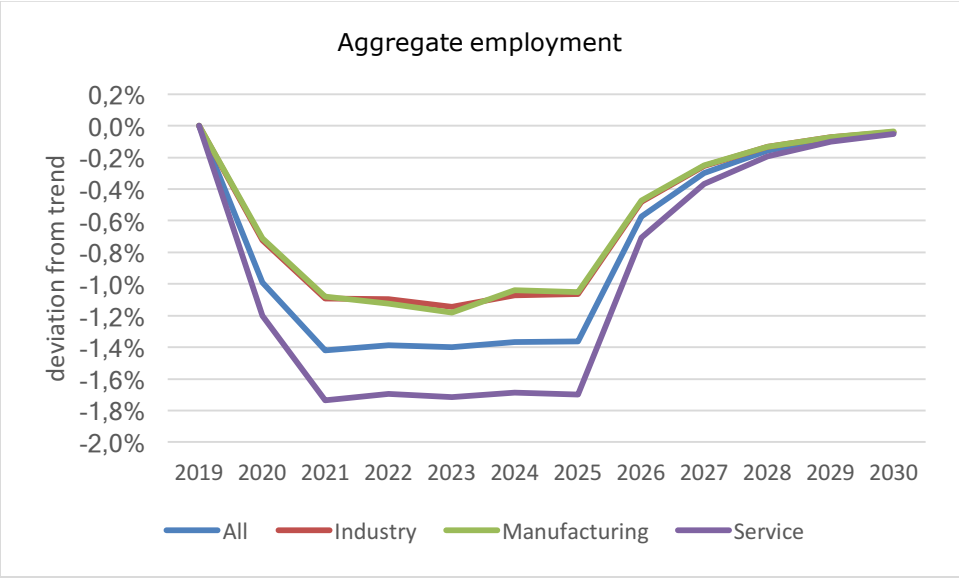


Figure 19. Sectors employment (not equilibrium adjusted) -Netherlands

Source: JRC, EU start-up calculator, Netherlands, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

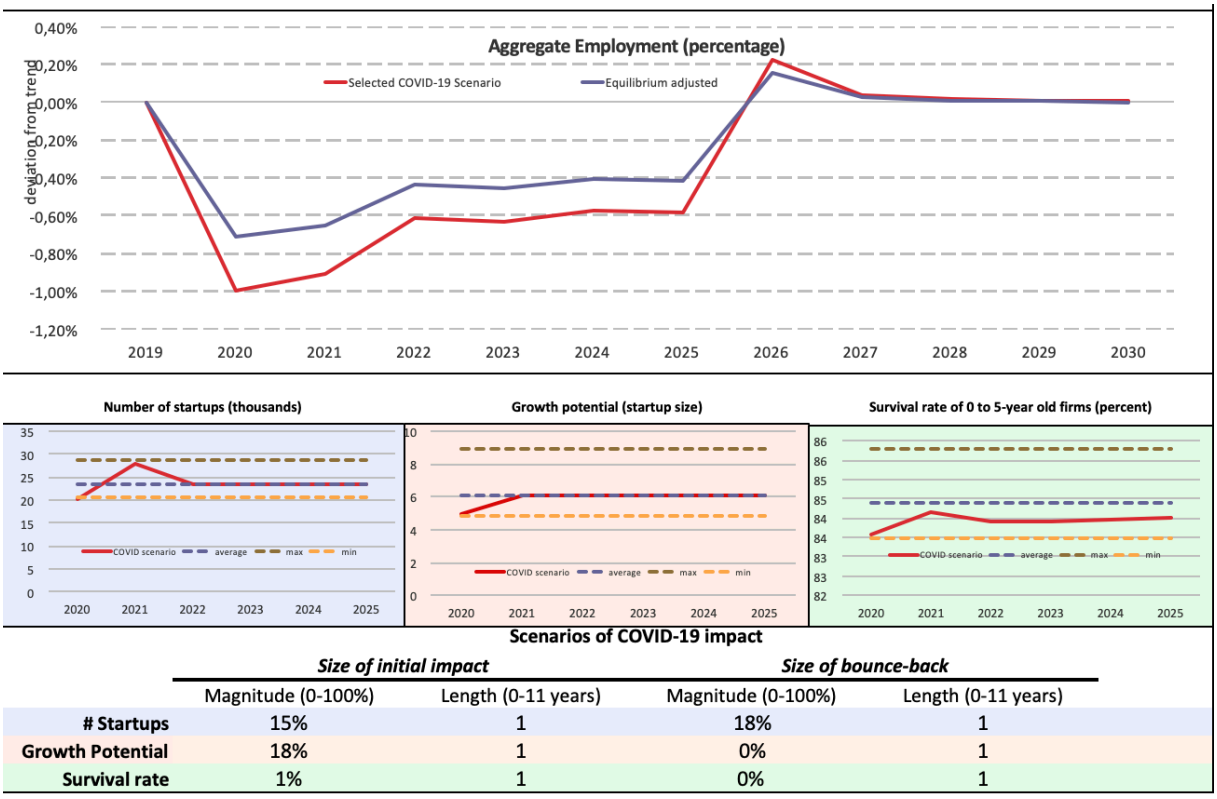
Figure 19 shows the results of the calculator for the three industries. The service sector shows a much larger reaction to the negative shock to the three margin. Employment declines up to 1.8% in 2021 and the cumulative employment loss in the period 2020-2030 is of more than 452,000 jobs. This result is driven by the fact that the service sector is more dynamic (in terms of entry and exit rates) and therefore reliant on young firms to provide employment. Hence, a disruption to start-ups and other young firms affects the service sector relatively strongly. Finally, in all the three sectors the decline in the number of start-ups accounts for about 30% of the effect and the growth potential for about 65%, leaving only a marginal role to the survival rate (Table XV).

Table XV. Share of aggregate employment loss accounted for by the margins Netherlands

	All	Industry	Manufacturing	Services
Cumulative employment loss	462 k	35 k	31 k	452 k
# Start-ups	43%	31%	30%	33%
Growth potential	52%	65%	65%	63%
Survival rate	5%	4%	5%	4%

Source: JRC, EU start-up calculator, Netherlands, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	15%	1	18%	1
Growth Potential	18%	1	0%	1
Survival rate	1%	1	0%	1

Figure 20. Bounce-back scenario in the number of firms, results for aggregate employment - Netherlands

Source: EU start-up calculator, Netherlands, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal to the sample *maximum* and last one year. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of delayed entry, pushing up the start-up rate in 2021. Following the discussion above, policies aimed at facilitating the entry of new firms in the market can be quite effective. The optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 20 where, after the initial negative shock, the number of start-ups is increased in 2021 to its sample *maximum*. After an initial decline in aggregate employment, the increased number of start-ups entering in 2021 causes a significant improvement in the employment trend and a lower cumulative job loss totalling to about 203,000. Thanks to the better outlook aggregate employment surpasses its pre COVID-19 level by 2026.

4.6 EU start-up calculator: Poland

4.6.1 Summary

- The COVID-19 crisis is likely to heavily affect young firms, leading to a decline in the start-up rate, higher exit of young firms, and lower growth of start-ups.
- According to the EU start-up calculator, these developments are likely to create substantial aggregate employment losses, of up to 5.6% of employment trend in 2020. The cumulative employment loss for the period 2020-2030 could be up to 2179,000.
- Effects are very persistent: full recovery may take more than a decade, even if start-up activity recovers to its pre-crisis level in one year.
- More than half of the aggregate employment loss is accounted for by decline in the survival rate, and 28% by the reduction in the number of start-ups. Only 20% is attributed to the decline in the growth potential of start-ups. Policies targeted to support young firm survival and promote new firms' entry would seem to be the most effective. The outlook is improved if in 2021 there is a rapid increase in the number of firms entering the economy. i.e. the cumulative aggregate employment loss is reduced to 1334,000.
- The Polish service sector may be affected particularly strongly, as young firms are particularly important job creators in this sector. In this sector most of the employment loss is due to the decline in the number of start-ups and in the survival rate.

4.6.2 Business dynamism in Poland

Before presenting the scenario analysis, we consider a number of statistics on the dynamism of Polish firms, see Table XVI.

The statistics show that, when it comes to entry and exit of firms, the Polish economy has almost a double start-up rate with respect to the EU average. An important share of job creation is attributed to start-ups and young firms, which is higher than the EU average. Over the sample, about 15% of firms exit within a given year, whereas the start-up rate is about 17%. Start-ups (firms of age zero) account for about 4% of aggregate employment whereas firms up to age 5 together account for more than 16%.[25] When looking at the sectoral disaggregation, the service sector contributes to most of the business dynamic of the overall economy with a start-up rate of above 17% and an employment share of start-ups of 19.5%.

[25] Table XVI also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

Table XVI. Descriptive statistics on the economy and sector dynamics of young firms - Poland

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	16.7%	11.7%	11.6%	17.2%
survival rate	92%	84.9%	89%	89%	84.6%
share of young firms	36%	43.5%	32.8%	32.3%	47%
employment share of start-ups	2.5%	4.1%	1.9%	2%	5%
employment share of young firms	12%	16.3%	9.2%	9.4%	19.5%

Source: JRC, Eurostat, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2012 to 2017.

4.6.3 Scenario analysis

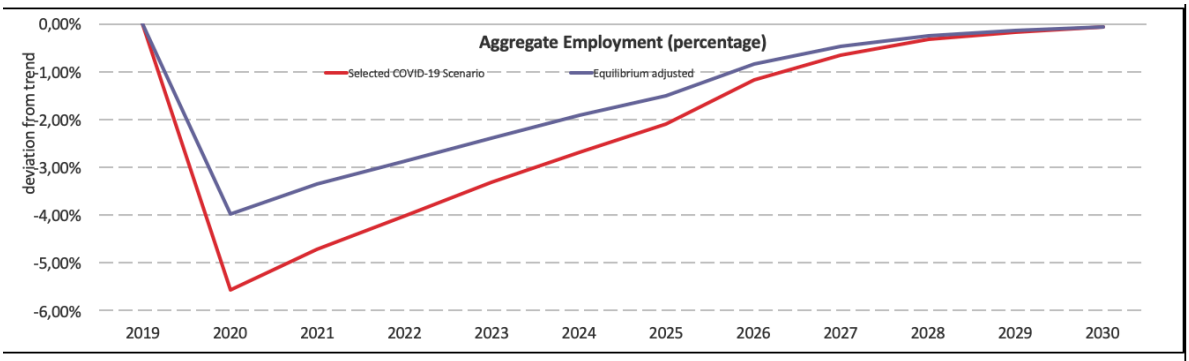
We consider a deterioration of the three margins described above. Specifically, we assume that the number of start-ups, and the growth potential fall from the sample *averages* to the sample *minima* (with shock that happen to be symmetric across sectors), while the survival rate is assumed to arbitrarily decline by 20%, see Table XVII.[26] Moreover, we assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. The scenario is the one of a strong but short-lived crisis expecting that once the pandemic is under control, the economic activity of start-ups and young firms will resume. This expectation seems to be consistent with the recent economic trend.

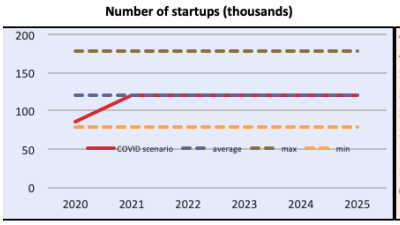
Table XVII. Scenario assumptions - Poland

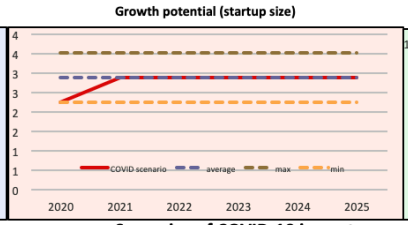
	All	Industry	Manufacturing	Services
# Start-ups	-30%	-30%	-30%	-30%
Growth potential	-22%	-22%	-22%	-22%
Survival rate	-20%	-20%	-20%	-20%

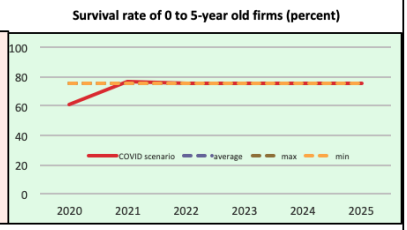
Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

[26] Note that in Table XVII Industry, Manufacturing and Serving sector are set to their sample *minima* which shocks happen to be the same for the number of start-ups and growth potential. However, the COVID-19 crisis seems to have impacted particularly strongly the service sector imposing strict lockdown and restrictive measures to sectors such as transport, tourism, and hospitality. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.









Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	30%	1	0%	1
Growth Potential	22%	1	0%	1
Survival rate	20%	1	0%	1

Figure 21. Scenario analysis for employment and the three margins of start-up activity - Poland

Source: EU start-up calculator, Poland, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration (for the survival rate it is arbitrarily assumed to be of -20%). The Business Demography data of Eurostat for Poland are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Figure 21 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator. For 2020, the calculator shows that the three margins together reduce aggregate employment by 5.6%. The recovery is slow: by 2026, aggregate employment is still more than 1% below the level it would have attained without the disruption of start-up activity. The employment loss, cumulated up to 2030 is 2179,000. Accounting for equilibrium adjustments, aggregate effects are dampened by 29%, leaving a cumulative employment loss of about 1556,000 (blue line in Figure 21). The decline in the number of start-ups accounts for 28%, while the decline in the survival rate for more than half of the total effect. These findings provide an important input for the policy discussion. The three different margins can be influenced by targeted policies. Potential employment benefits of policies targeted towards firm survival and to promote firm entry suggest to be highest. However, the cost of different policy options needs to be taken into account.

Moreover, we consider how sectors may be affected differently. Table XVI shows that, compared to manufacturing and overall industry, firms in the service sector are more dynamic. This sector has higher start-up and exit rates, and a much higher employment share of start-ups and other young firms.

Figure 22 shows the results of the calculator for the three industries. The service sector shows a larger employment loss, even though the shocks to the three margins are assumed to be symmetric across sectors (Table XVII). This result is driven by the fact

that the service sector is more dynamic in terms of entry and exit and therefore reliant on young firms to provide employment.

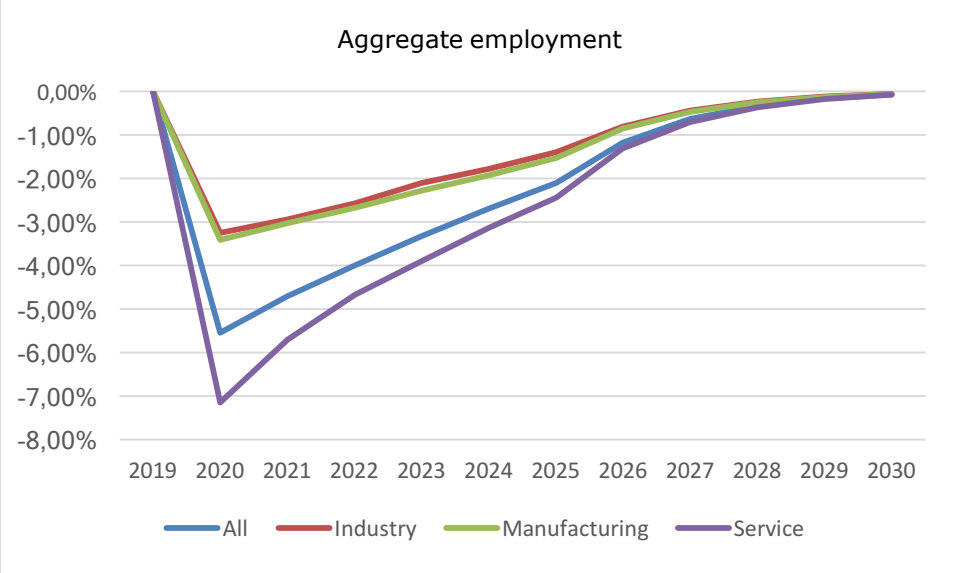


Figure 22. Sectors employment (not equilibrium adjusted) - Poland

Source: JRC, EU start-up calculator, Poland, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration. (for the survival rate it is arbitrarily assumed to be of -20%). The Business Demography data of Eurostat for Poland are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

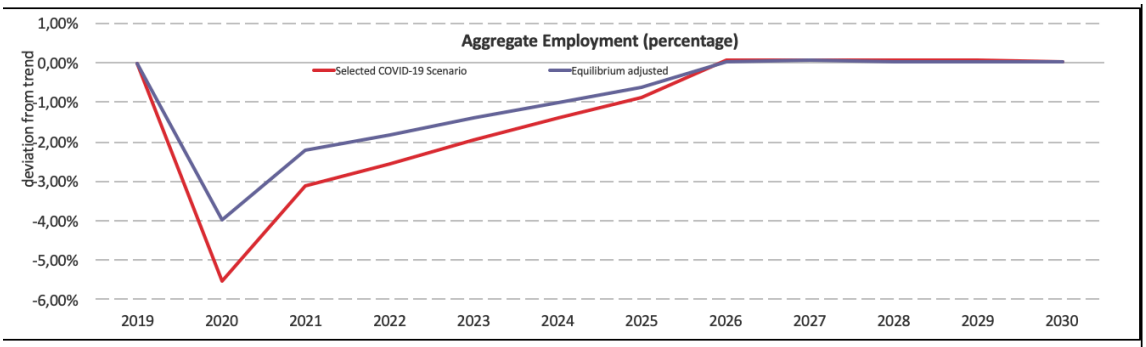
Table XVIII. Share of aggregate employment loss accounted for by the margins - Poland

	All	Industry	Manufacturing	Services
Cumulative employment loss	2179 k	475 k	429 k	1441 k
# Start-ups	28%	26%	26%	27%
Growth potential	20%	20%	20%	20%
Survival rate	52%	54%	54%	53%

Source: JRC, EU start-up calculator, Poland, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Hence, a disruption to start-ups and other young firms affects the service sector relatively strongly causing a loss of aggregate employment of more than 1441,000 jobs (Table XVIII). The decline in the number of start-ups explains around 27% of the employment effect, while the survival rate more than half, leaving only one fifth of the effect explained by the growth potential. This pattern is present also in the industry and manufacturing sector as a consequence of a symmetric shocks across sectors. These considerations are indicative that policy targeted to support firms to tackle survival challenges and support entry could have a significant effect in mitigating the impact that the COVID-19 pandemic will have on aggregate employment.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	30%	1	40%	1
Growth Potential	22%	1	0%	1
Survival rate	20%	1	0%	1

Figure 23. Bounce-back scenario in the number of firms, results for aggregate employment - Poland

Source: EU start-up calculator, Poland, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration (for the survival rate it is arbitrarily assumed to be of -20%). The Business Demography data of Eurostat for Poland are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal to the *maximum* value registered in the time series. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of a postponement of start-up decisions with more firm entry in 2021 especially if supported by specific policies targeted to start-ups that could reduce entry barriers, promote innovation and relax financial constraints. The optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 23 where, after the initial negative shock, the number of start-ups is increased in 2021 to the *maximum* level registered in the time series. After an initial sharp decline in aggregate employment, the increased number of start-ups entering in 2021 causes an improvement of the employment trend and a lower

cumulative job loss totalling to about 1334,000. Thanks to the better outlook aggregate employment reaches its pre COVID-19 level by 2026. This is due to the fact that the number of start-ups account for a large share of the impact on aggregate employment, i.e. about 30%, of the total effect on employment (see Table XVIII) and a large positive shock simulated.

4.7 EU start-up calculator: Romania

4.7.1 Summary

- The COVID-19 crisis is likely to heavily affect young firms, leading to a decline in the start-up rate, a higher exit of young firms, and lower growth of start-ups.
- According to the EU start-up calculator, these developments are likely to create substantial aggregate employment losses, of up to 3.4% in 2020. The cumulative employment loss for the period 2020-2030 could be up to 632,000.
- Effects are very persistent: full recovery may take more than a decade, even if start-up activity recovers to its pre-crisis level in one year. By 2026, aggregate employment is still more than 0.5% below the level it would have attained without the disruption of start-up activity
- The decline in the number of start-ups accounts for about 39% of the employment loss, the decline in the survival rate for about 43% and the decline in the growth potential of start-ups for about 18%. Policies targeted to favour firm survival and incentivise entry would seem to be the most effective in Romania. The outlook is significantly improved if in 2021 there is a rapid increase in the number of firms entering the economy, i.e. the cumulative aggregate employment loss is reduced to 331,000.
- The Romanian service sector may be affected particularly strongly, as young firms are particularly important job creators in this sector.

4.7.2 Business dynamism in Romania

Before presenting the scenario analysis, we consider a number of statistics on the dynamism of Romanian firms, see Table XIX. The statistics show that, when it comes to firm entry and exit, the Romanian economy is in line with the EU 27 average, relying importantly on start-ups for job creation. Over the sample, about 12% of firms exit within a given year, whereas the start-up rate is above 10%. Start-ups (firms of age zero) account for about 3% of aggregate employment whereas firms up to age 5 together account for more than 17% implying a higher contribution from young firm as job creators in Romania relative to the EU average of 12%. [27]

[27] Table XIX also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

Table XIX. Descriptive statistics on the economy and sector dynamics of young firms - Romania

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	10.2%	8.6%	8.4%	10%
survival rate	92%	92.1%	93%	93.1%	92.1%
share of young firms	36%	37.5%	32.5%	31.5%	36.9%
employment share of start-ups	2.5%	3%	1.8%	1.7%	3.5%
employment share of young firms	12%	17.6%	12.7%	11.4%	20%

Source: JRC, Eurostat, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2008 to 2017.

Moreover, recent data from the Romanian National Trade Statistical Office shows an increasing contraction in the number of new businesses created since the beginning of the year with respect to the same period in 2019. While the negative trend is present since the beginning of the year, it has sharply deteriorated since the start of the COVID-19 pandemic and the ensuing hibernation of most of the economic activities. In particular, 54% less businesses were created in March, (when the COVID-19 pandemic started), 81% less in April and 34% less in May, in each case compared to the corresponding month of 2019. Then, the number of new firms seems to have slightly bounced back in summer (see Figure 24). These statistics show an important and persistent disruption of start-up activity due to the COVID-19 pandemic. This can have important repercussions for aggregate employment, especially if the number of start-ups does not recover quickly as Figure 24 seems to suggest.

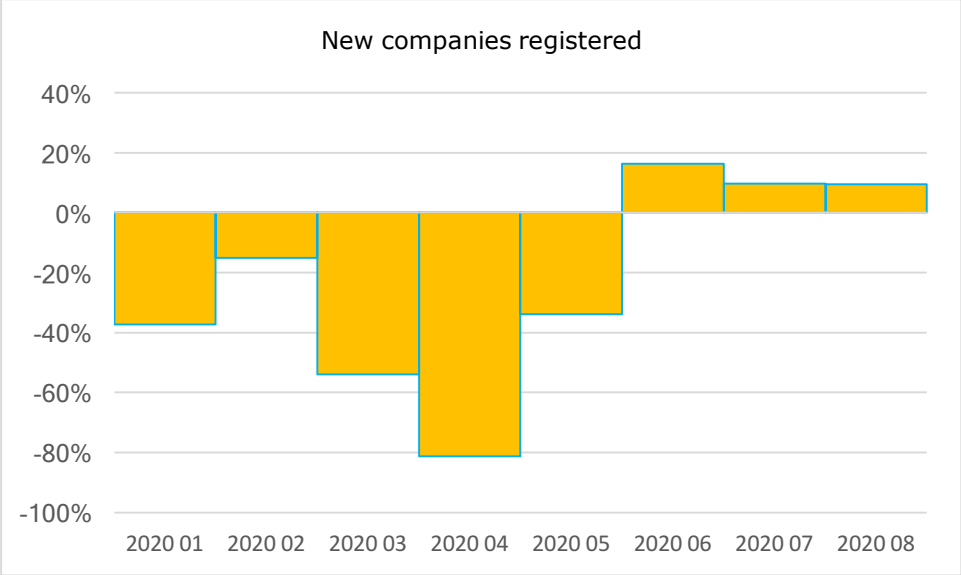


Figure 24. Annual change in the number of new companies registered in 2020 with respect to the same period in 2019 (percentage) - Romania

Source: JRC, data from the Romanian National Trade Statistical Office (ONRC), 2020.

4.7.3 Scenario analysis

We consider a deterioration of the three margins described above. Specifically, we assume that the number of start-ups, the survival rate, and the growth potential all fall from the sample *averages* to the sample *minima* (which were reached in the years following the financial crisis of 2008), see Table XX.[28] Moreover, we assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. The scenario is the one of a strong but short-lived crisis expecting that once the containment measures are lifted, the economic activity of start-ups and young firms will resume.

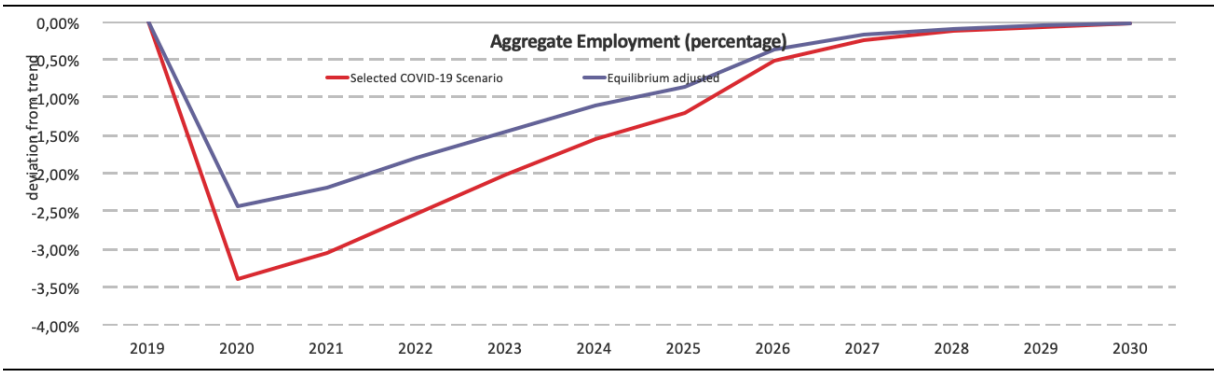
Table XX. Scenario assumptions - Romania

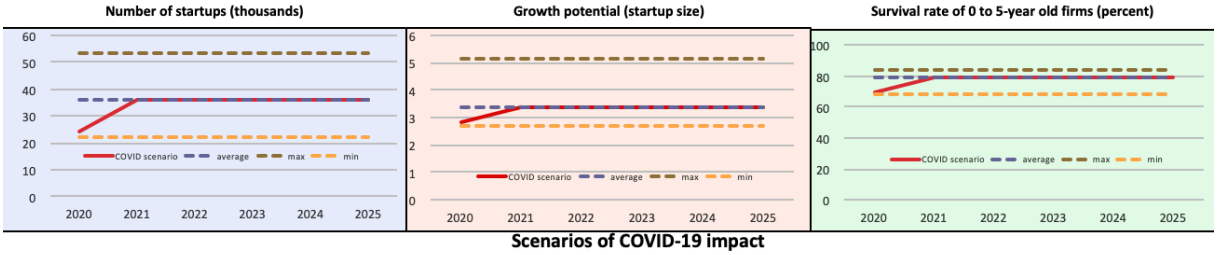
	All	Industry	Manufacturing	Services
# Start-ups	-33%	-30%	-30%	-33%
Growth potential	-15%	-33%	-33%	-15%
Survival rate	-12%	-12%	-12%	-11%

Note(1): The sector aggregate reflects the classifications available in Eurostat, i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Figure 25 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator. For 2020, the calculator shows that the three margins together reduce aggregate employment by over 3.4%. The recovery is very slow: by 2026, aggregate employment is still more than 0.5% below the level it would have attained without the disruption of start-up activity. The employment loss, cumulated up to 2030 is 632,000. Accounting for equilibrium adjustments, aggregate effects are dampened by 29%, leaving a cumulative employment loss of about 452,000. The decline in the number of start-ups accounts for about 39% of the effect and the survival rate for about 43%. The decline in the growth potential accounts for the remaining 18%. These findings provide an important input for the policy discussion. The three different margins can be influenced by targeted policies. Potential employment benefits of policies targeted towards promote firm survival and ease firm entry suggest to be highest. However, the cost of different policy options needs to be taken into account.

[28] Note that in Table XX Industry, Manufacturing and Serving sector are set to their sample *minima* which happens to be the similar for the number of start-ups and the survival rate. However, the COVID-19 crisis seems to have impacted particularly strongly the service sector imposing strict lockdown measures to sectors such as transport, tourism, and hospitality. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.





Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	33%	1	0%	1
Growth Potential	15%	1	0%	1
Survival rate	12%	1	0%	1

Figure 25. Scenario analysis for employment and the three margins of start-up activity - Romania

Source: EU start-up calculator, Romania, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Moreover, we consider how sectors may be affected differently. Table XIX shows that, compared to manufacturing and overall industry, firms in the service sector are relatively more dynamic. This sector has higher start-up and exit rates, and a much higher employment share of start-ups and other young firms.

Figure 26 shows the results of the calculator for the three industries. The service sector shows a much larger employment loss. This, despite the fact that the decline in the survival rate and growth potential assumed is actually smaller than the one assumed for the manufacturing and industry sector. This result is driven by the fact that the service sector is more dynamic and therefore reliant on young firms to provide employment. Hence, a disruption to start-ups and other young firms affects the service sector strongly causing a loss of aggregate employment of more than 340,000 jobs (Table XXI). The decline in the number of start-ups and in the survival rate account for about 41% of the employment loss each, while the growth potential for about 18%. In the industry ad manufacturing sectors, the decline of the three margins account for more than 30% each. This is indicative that different policy mixes should be targeted at different sectors. Policies aimed at encouraging firm entry and survival seem particular effective in the service sector, while a policy mixed targeted to incentivize firm entry, scalability and reduce exit in the industry and manufacturing sector could have a significant effect in mitigating the impact that the COVID-19 pandemic will have on aggregate employment.

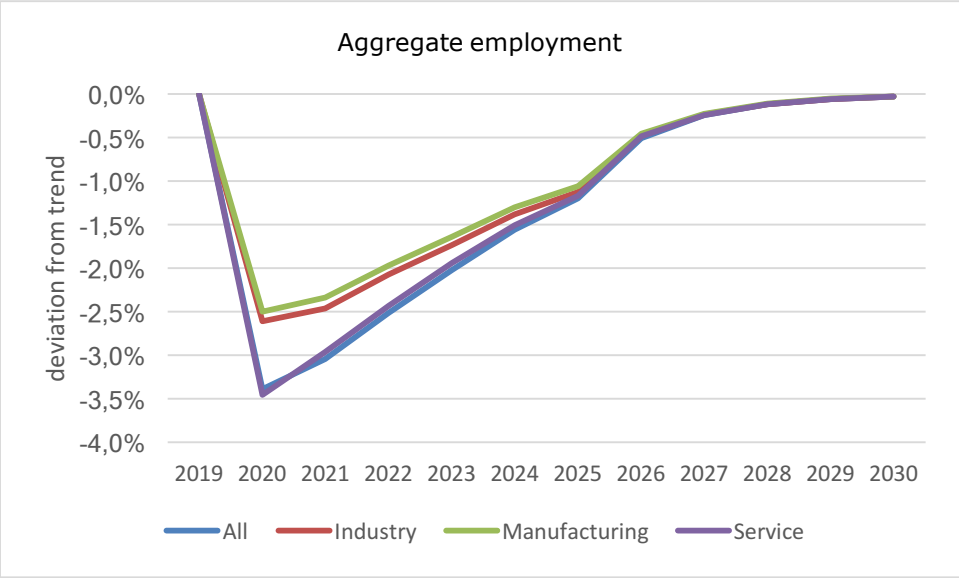


Figure 26. Sectors employment (not equilibrium adjusted) - Romania

Source: JRC, EU start-up calculator, Romania, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat - i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

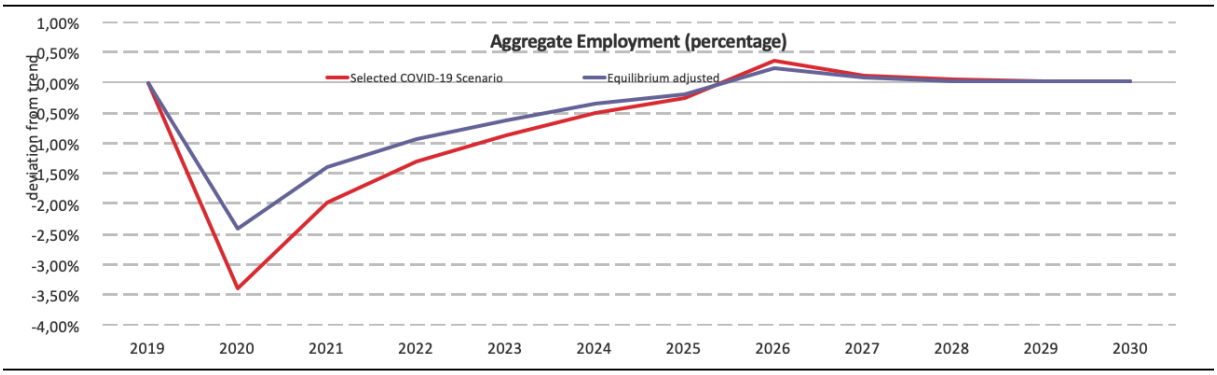
Table XXI. Share of aggregate employment loss accounted for by the three margins - Romania

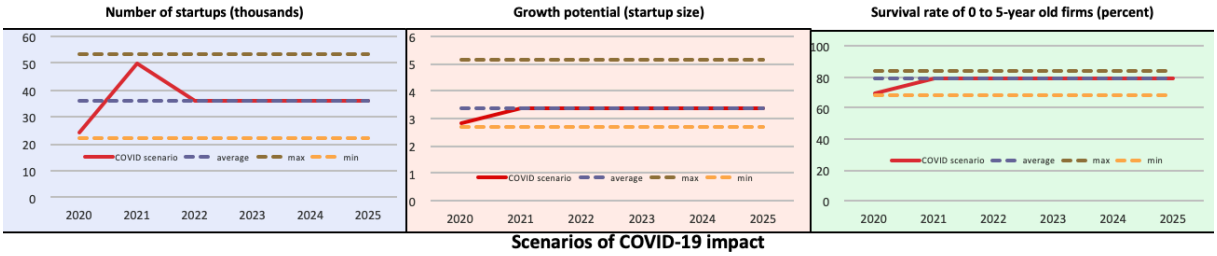
	All	Industry	Manufacturing	Services
Cumulative employment loss	452 k	183 k	148 k	340 k
# Start-ups	39%	30%	30%	41%
Growth potential	18%	32%	32%	18%
Survival rate	43%	38%	38%	41%

Source: JRC, EU start-up calculator, Romania, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of a postponement of start-up decisions with more firm entry in 2021, especially when targeted policies to promote firm entry are put in place. The optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 26 where, after the initial negative shock, the number of start-ups is increased in 2021 to the maximum level registered in the time series. After an initial sharp decline in aggregate employment, the increased number of start-ups entering in 2021 causes a significant improvement of the employment trend and a lower cumulative job loss totalling to about 331,000. Thanks to the better outlook aggregate employment out-reaches its pre COVID-19 level in 2026.





Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	33%	1	38%	1
Growth Potential	15%	1	0%	1
Survival rate	12%	1	0%	1

Figure 26. Bounce-back scenario in the number of firms, results for aggregate employment - Romania

Source: EU start-up calculator, Romania, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal to the sample *maximum* and last one year. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

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4.8 EU start-up calculator: Slovakia

4.8.1 Summary

- The COVID-19 crisis is likely to heavily affect young firms, leading to a decline in the start-up rate, higher exit of young firms, and lower growth of start-ups.
- According to the EU start-up calculator, these developments are likely to create substantial aggregate employment losses, of up to 6.9% of employment trend in 2020. The cumulative employment loss for the period 2020-2030 could be up to 341,000.
- Effects are very persistent: full recovery may take more a decade, even if start-up activity recovers to its pre-crisis level in one year.
- About half of the aggregate employment loss is accounted for by the reduction of the survival rate and about 27% by the reduction in the number of start-ups. Policies targeted to support young firm survival and promote new firms' entry would seem to be the most effective. The outlook is improved if in 2021 there is a rapid increase in the number of firms entering the economy. i.e. the cumulative aggregate employment loss is reduced to 231,000.

- The Slovak service sector may be affected particularly strongly, as young firms are particularly important job creators in this sector. Across the three sectors, the survival rate accounts for about half of employment loss.

4.8.2 Business dynamism in Slovakia

Before presenting the scenario analysis, we consider a number of statistics on the dynamism of Slovak firms, see Table XXII.

Table XXII. Descriptive statistics on the economy and sector dynamics of young firms - Slovakia

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	11.8%	10.7%	10.9%	11.6%
survival rate	92%	85.2%	89.2%	89.2%	84.9%
share of young firms	36%	40.4%	33.5%	39.9%	50.2%
employment share of start-ups	2.5%	3.2%	1.2%	1.3%	4.2%
employment share of young firms	12%	16.7%	7.3%	7.3%	21.8%

Source: JRC, Eurostat, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2012 to 2017.

The statistics show that, when it comes to entry and exit of firms, the Slovak economy has a higher start-up rate and exit rate than the EU average. A considerably important share of job creation is attributed to start-ups and young firms. Over the sample, about 15% of firms exit within a given year, whereas the start-up rate is about 12%. Start-ups (firms of age zero) account for more than 3% of aggregate employment whereas firms up to age 5 together account for almost 17%. When looking at the sectoral disaggregation, the service sector contributes to most of the business dynamic of the overall economy with a share of young firms above 50% and an employment share of young firms of almost 22%, while industry and manufacturing have an employment share of young firms just above 7%.[29]

Similarly to other European countries, also the business dynamism of the Slovak economy has been affected by the crisis. The contraction in the creation of new companies appear evident starting from March 2020. Figure 27 shows how the number of new companies created starts to decline in March by 19.7%, to then drop in April by 45.2% and in May by 25.9%, in each case compared to the corresponding month of 2019. Hence, Slovakia has suffered from a significant disruption of start-up activity during the first peak of the COVID-19 pandemic. However, after an improvement of the situation in the months of June and especially July, August registered again a decline in the number of new business registered. Moreover, in Slovakia, as in many other European countries the pandemic seems to dramatically accelerate again. If this will once more slow down start-up activity the repercussion for aggregate employment may be persistent and important.

[29] Table XXII also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

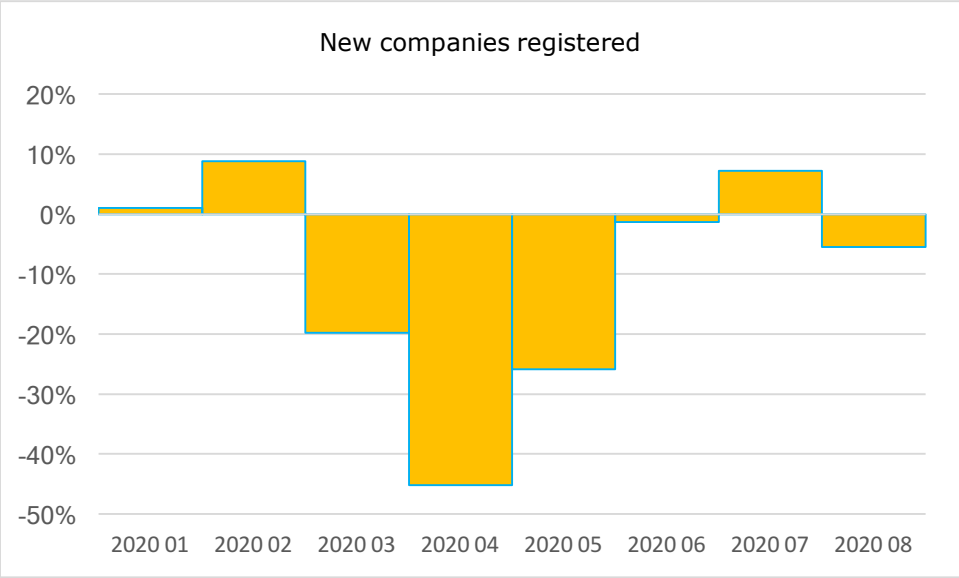


Figure 27. Annual change in the number of new companies registered in 2020 with respect to the same period in 2019 (percentage) - Slovakia

Source: JRC, provisional data on the total of new economic subjects registered in the statistical register of organizations during the period January 2019 and October 2020. The data are provided by the Slovak statistical office (www.statistics.sk).

4.8.3 Scenario analysis

We consider a deterioration of the three margins described above consistent with the scenarios assumed in the previous analysis. Specifically, we assume that the number of start-ups and the growth potential fall from the sample *averages* to the sample *minima*, while the survival rate drops considerably and seemingly to what assumed for other East European Countries[30], see Table XXIII.[31] Moreover, we assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. The scenario is the one of a strong but short-lived crisis.

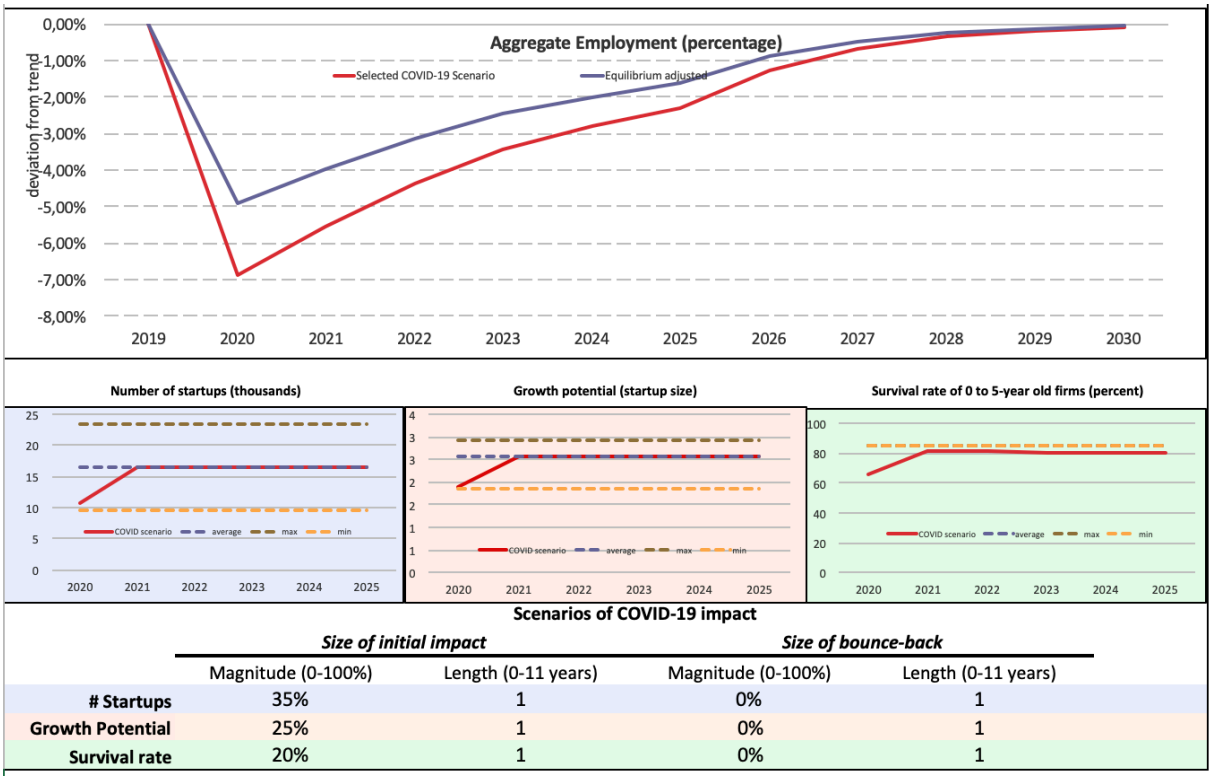
Table XXIII. Scenario assumptions - Slovakia

	All	Industry	Manufacturing	Services
# Start-ups	-35%	-35%	-35%	-35%
Growth potential	-25%	-20%	-20%	-25%
Survival rate	-20%	-20%	-20%	-20%

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

[30] In the case of Slovakia, Eurostat data for the survival rate start in 2013. The short time series does not allow us to have 5 years to construct the 1-5 survival rate. As a consequence, the minimum, maximum and average value of the survival rate are the same number.

[31] Note that in Table XXIII Industry, Manufacturing and Serving sector are set to their sample *minima* which happens to be the same for the number of start-ups. However, the COVID-19 crisis seems to have impacted particularly strongly the service sector imposing strict lockdown measures to sectors such as transport, tourism, and hospitality. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	35%	1	0%	1
Growth Potential	25%	1	0%	1
Survival rate	20%	1	0%	1

Figure 28. Scenario analysis for employment and the three margins of start-up activity - Slovakia

Source: EU start-up calculator, Slovakia, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration (for the survival rate it is arbitrarily assumed to be of -20%). The Business Demography data of Eurostat for Slovakia are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Figure 28 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator. For 2020, the calculator shows that the three margins together reduce aggregate employment by 6.9%. The recovery is slow: by 2026, aggregate employment is still more than 1.2% below the level it would have attained without the disruption of start-up activity. The employment loss, cumulated up to 2030 is 341,000. Accounting for equilibrium adjustments, aggregate effects are dampened by 29%, leaving a cumulative employment loss of about 244,000 (blue line in Figure 28). The decline in the survival rate accounts for more than half of the effect, while the decline in the number of start-ups accounts for about 27%. These findings provide an important input for the policy discussion. The three different margins can be influenced by targeted policies. Potential employment benefits of policies targeted towards firm survival and to promote firm entry suggest to be highest. However, the cost of different policy options needs to be taken into account.

Moreover, we consider how sectors may be affected differently. Table XXII shows that, compared to manufacturing and overall industry, firms in the service sector are somewhat more dynamic. This sector has higher start-up and exit rates, and a much higher employment share of start-ups and other young firms compared to the industry and manufacturing sectors.

Figure 29 shows the results of the calculator for the three industries. The service sector shows a larger relative employment loss with a decline in aggregate employment that reaches almost 9% in 2020. This result is driven by the fact that the service sector is

more dynamic in terms of entry and exit and young firms account for a larger share of employment compare to the industry and manufacturing sectors.

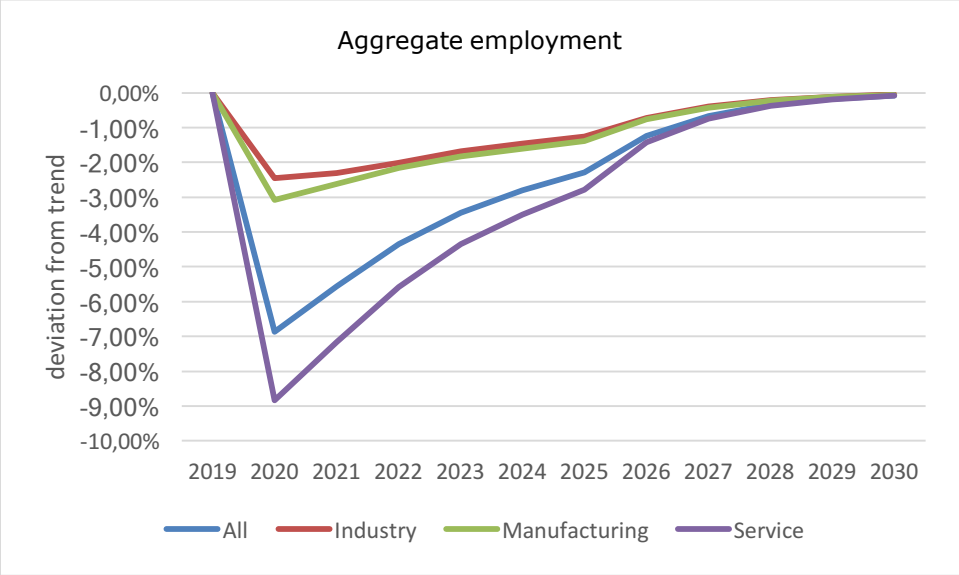


Figure 29. Sectors employment (not equilibrium adjusted) - Slovakia

Source: JRC, EU start-up calculator, Slovakia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration (for the survival rate it is arbitrarily assumed to be of -20%). The Business Demography data of Eurostat for Slovakia are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

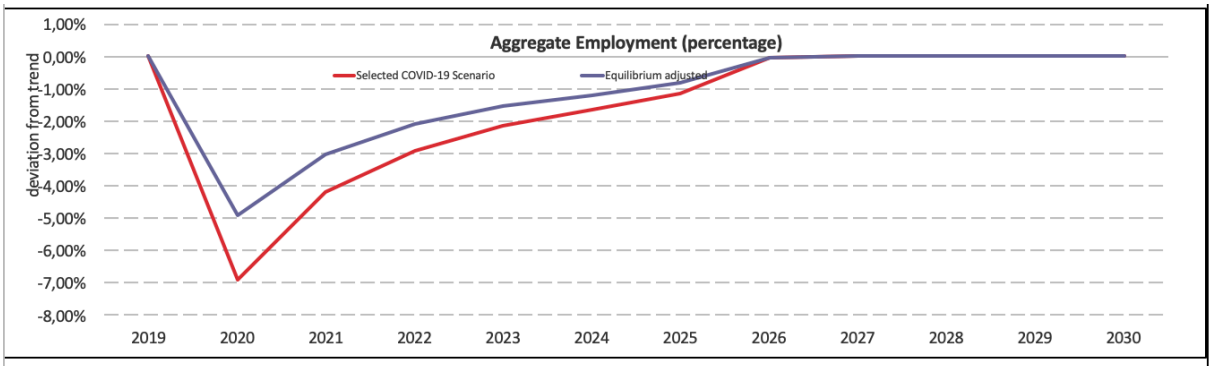
Table XXIV. Share of aggregate employment loss accounted for by the margins - Slovakia

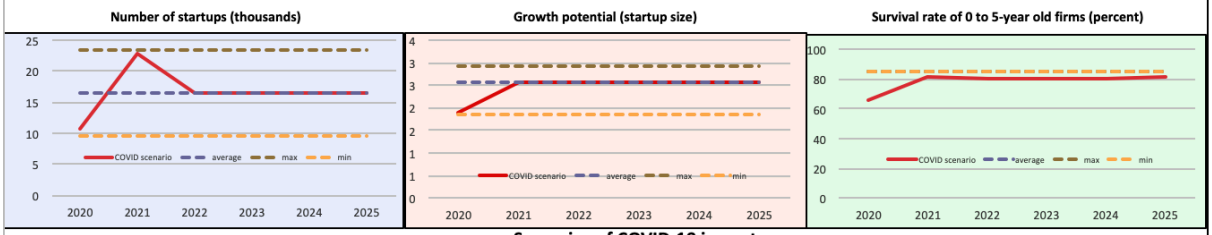
	All	Industry	Manufacturing	Services
Cumulative employment loss	341 k	62 k	64 k	240 k
# Start-ups	27%	29%	28%	27%
Growth potential	19%	16%	16%	19%
Survival rate	54%	55%	56%	54%

Source: JRC, EU start-up calculator, Slovakia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Hence, a disruption to start-ups and other young firms affects the service sector relatively strongly, causing a loss of aggregate employment of about 240,000 jobs (Table XXIV). In all the three sectors the margin with the highest impact on aggregate employment is the survival rate accounting for about half of the job loss. The decline in the number of start-ups accounts for almost 30% across sectors. These considerations are indicative that policy targeted to support firms to tackle survival challenges across sectors and support entry in the service sector could have a significant effect in mitigating the impact that the COVID-19 pandemic will have on aggregate employment.





Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	35%	1	40%	1
Growth Potential	25%	1	0%	1
Survival rate	20%	1	0%	1

Figure 30. Bounce-back scenario in the number of firms, results for aggregate employment - Slovakia

Source: EU start-up calculator, Slovakia, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of the duration of one year (for the survival rate it is arbitrarily assumed to be of -20%). The Business Demography data of Eurostat for Slovakia are available from 2012 to 2017. The short time series does not allow to compute the 1-5 survival rate. As a consequence, the *minimum*, *maximum* and average value of the survival rate collapse to the same number (yellow line in the plot related to the shock to the survival rate). The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal to the sample *maximum* and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of a postponement of start-up decisions with more firm entry in 2021 especially if supported by specific policies targeted to start-ups that could reduce the entry barriers, promote innovation and relax financial constraints. The optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 30 where, after the initial negative shock, the number of start-ups is increased in 2021 to the maximum level registered in the time series. After an initial sharp decline in aggregate employment, the increased number of start-ups entering in 2021 causes an improvement of the employment trend and a lower

cumulative job loss totalling to about 231,000. Thanks to the better outlook aggregate employment reaches its pre COVID-19 level by 2026.

4.9 EU start-up calculator: Slovenia

4.9.1 Summary

- The COVID-19 crisis is likely to heavily affect young firms, leading to a decline in the start-up rate, higher exit of young firms, and lower growth of start-ups.
- According to the EU start-up calculator, these developments are likely to create substantial aggregate employment losses, of up to 1.2% of employment trend in 2020. The cumulative employment loss for the period 2020-2030 could be up to 29,000.
- Effects are very persistent: full recovery may take a decade, even if start-up activity recovers to its pre-crisis level in one year.
- More than half of the aggregate employment loss is accounted for by the reduction of the growth potential of start-ups, while the decline in the number of start-ups account for 27%. Policies targeted to support scaling up of entrants and promote new firms' entry would seem to be the most effective. The outlook is improved if in 2021 there is a rapid increase in the number of firms entering the economy. i.e. the cumulative aggregate employment loss is reduced to 21,000.
- The Slovenian service sector may be affected relatively strongly, as young firms are particularly important job creators in this sector. In all three sectors more than 40% of the job loss is due to a decline in the number of start-ups.

4.9.2 Business dynamism in Slovenia

Before presenting the scenario analysis, we consider a number of statistics on the dynamism of Slovenian firms, see Table XXV.

Table XXV. Descriptive statistics on the economy and sector dynamics of young firms - Slovenia

	EU 27 All	All	Industry	Manufacturing	Services
start-up rate	9.2%	10.1%	7.3%	7.1%	10.5%
survival rate	92%	90.4%	93%	93.2%	90.7%
share of young firms	36%	38.9%	28%	27.3%	39.6%
employment share of start-ups	2.5%	2.2%	0.9%	0.9%	2.6%
employment share of young firms	12%	12.6%	5.8%	5.8%	14.3%

Source: JRC, Slovenia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies. The time series is from 2008 to 2017.

The statistics show that, when it comes to entry and exit of firms, the Slovenian economy has a slightly higher start-up rate than the EU average. An important share of job creation is attributed to start-ups and young firms, in line with the EU average. Over the

sample, about 10% of firms exit and entry within a given year. Start-ups (firms of age zero) account for about 2.2% of aggregate employment whereas firms up to age 5 together account for more than 12%. When looking at the sectoral disaggregation, the service sector contributes to most of the business dynamic of the overall economy with an employment share of start-ups of almost 3% and an employment share of young firms above 14%.[32]

The creation of new companies has been affected by the crisis showing an contraction in the number of new firms registering especially during the first wave of the pandemic with respect to the same period in 2019. In particular, Figure 31 shows how the number of new companies created declines in March by 19%, and drops in April by almost 80% and in May by 42%. Fortunately, from June onwards there is a bounce-back in the number of new businesses registered during all the summer months of 2020. This may mitigate the economic impact of the COVID-10 crisis. Nevertheless, the "unborn" start-ups may cause important repercussions for aggregate employment, especially if the number of start-ups may be further affected by the second wave of the epidemic and a potential slowdown of the economy.

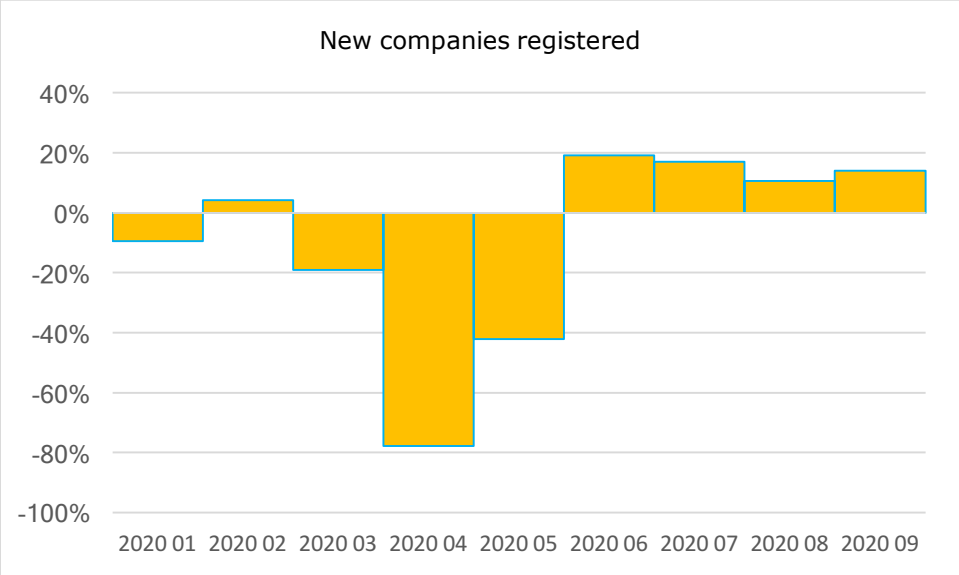


Figure 31. Annual change in the number of new companies registered in 2020 with respect to the same period in 2019 (percentage) - Slovenia

Source: JRC, provisional data on the total of new companies registered are provided by the business register of Slovenia (AJPES)

4.9.3 Scenario analysis

We consider a deterioration of the three margins described above. Specifically, we assume that the number of start-ups, the growth potential and the survival rate fall all from the sample *averages* to the sample *minima* (which were reached in the years following the financial crisis of 2008), see Table XXVI.[33] Moreover, we assume that this decline lasts for one year only. From 2021 onwards, the three margins are assumed to be back at their sample averages. The scenario is the one of a strong but short-lived crisis

[32] Table XXV also indicates that industry and manufacturing are very similar to each other as the latter is a large component of the former.

[33] Note that in Table XXVI Industry, Manufacturing and Serving sector are set to their sample minima which happens to be lower for industry and manufacturing. However, the COVID-19 crisis seems to have impacted particularly strongly the service sector imposing strict lockdown measures to sectors such as transport, tourism, and hospitality. Alternative scenarios that take into account this asymmetry can easily be computed as soon as sectoral data become available.

expecting that once the containment measures are lifted, the economic activity of start-ups and young firms will resume. This expectation seems to be consistent with the recent economic trend.

Table XXVI. Scenario assumptions - Slovenia

	All	Industry	Manufacturing	Services
# Start-ups	-13%	-25%	-25%	-18%
Growth potential	-25%	-12%	-10%	-4%
Survival rate	-4%	-6%	-6%	-4%

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

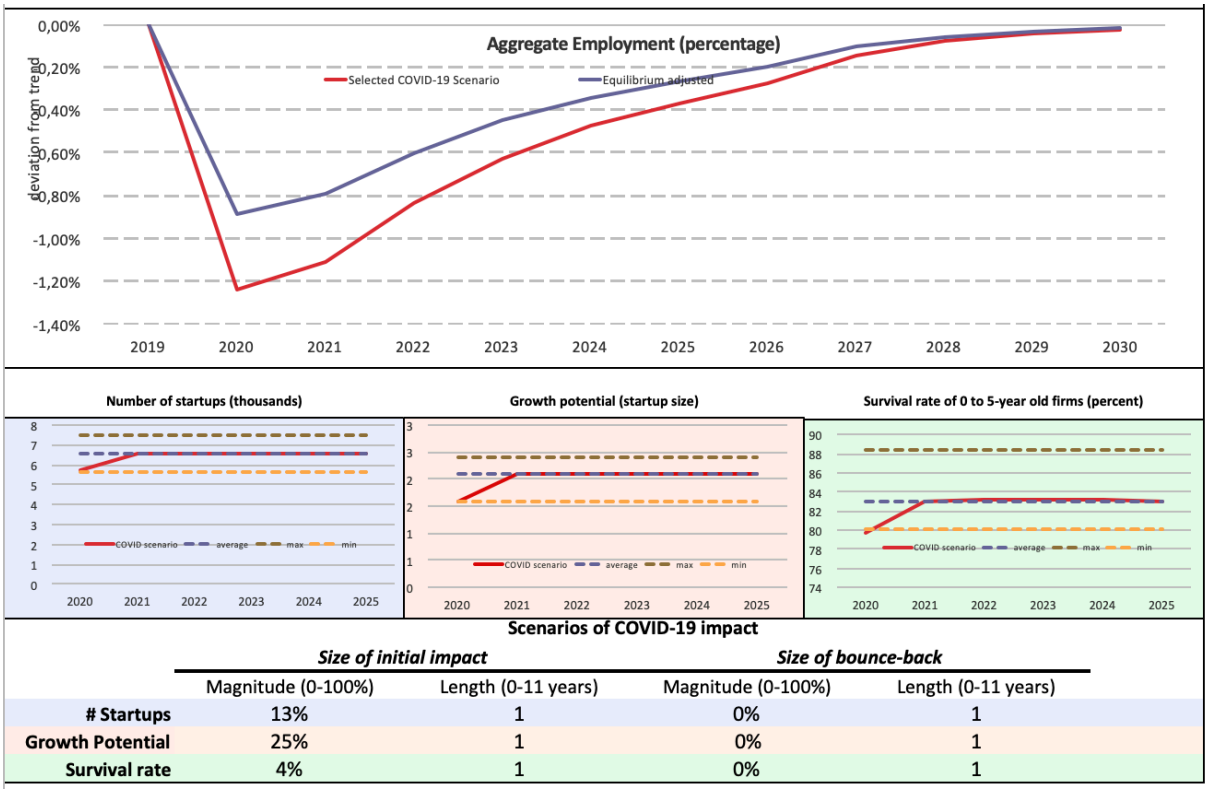


Figure 32. Scenario analysis for employment and the three margins of start-up activity - Slovenia

Source: EU start-up calculator, Slovenia 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

Figure 32 shows the scenario assumptions on the three margins, as well as the implications for aggregate employment produced by the calculator. For 2020, the calculator shows that the three margins together reduce aggregate employment by just over 1.2%. However, the recovery is slow: by 2026, aggregate employment is still more than 0.3% below the level it would have attained without the disruption of start-up

activity. The employment loss, cumulated up to 2030 is 29,200. Accounting for equilibrium adjustments, aggregate effects are dampened by 29%, leaving a cumulative employment loss of about 20,880 (blue line in Figure 32). The decline in the growth potential is also due to the large shock assumed for this margin. The number of start-ups accounts for about 27% and the survival rate for roughly 21%. These findings provide an important input for the policy discussion. The three different margins can be influenced by targeted policies. Potential employment benefits of policies targeted towards easing firms' scalability and promoting firm entry suggest to be highest. However, the cost of different policy options needs to be taken into account.

Moreover, we consider how sectors may be affected differently. Table XXV shows that, compared to manufacturing and overall industry, firms in the service sector are somewhat more dynamic. This sector has higher start-up and exit rates, and a much higher employment share of start-ups and other young firms.

Figure 33 shows the results of the calculator for the three industries. The service sector shows a larger employment loss, even though the decline in the three margins assumed is actually somewhat smaller, in particular in the shock to the growth potential and number of start-ups (Table XXVI). This result is driven by the fact that the service sector is more dynamic in terms of entry and exit and therefore reliant on young firms to provide employment.

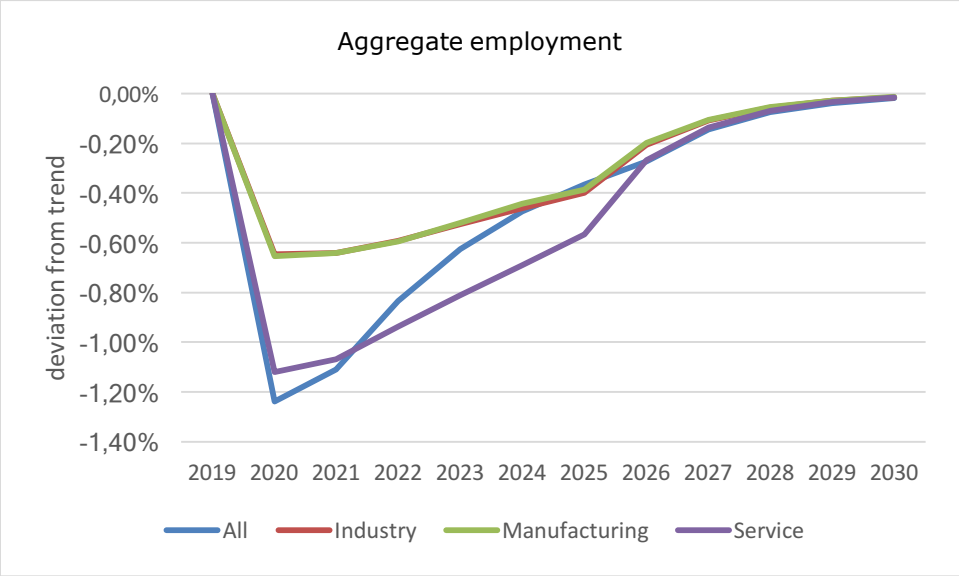


Figure 33. Sectors employment (not equilibrium adjusted) - Slovenia

Source: JRC, EU start-up calculator, Slovenia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Note(2): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* in the respective sectors and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The employment path does not take into account general equilibrium effects.

Table XXVII. Share of aggregate employment loss accounted for by the margins - Slovenia

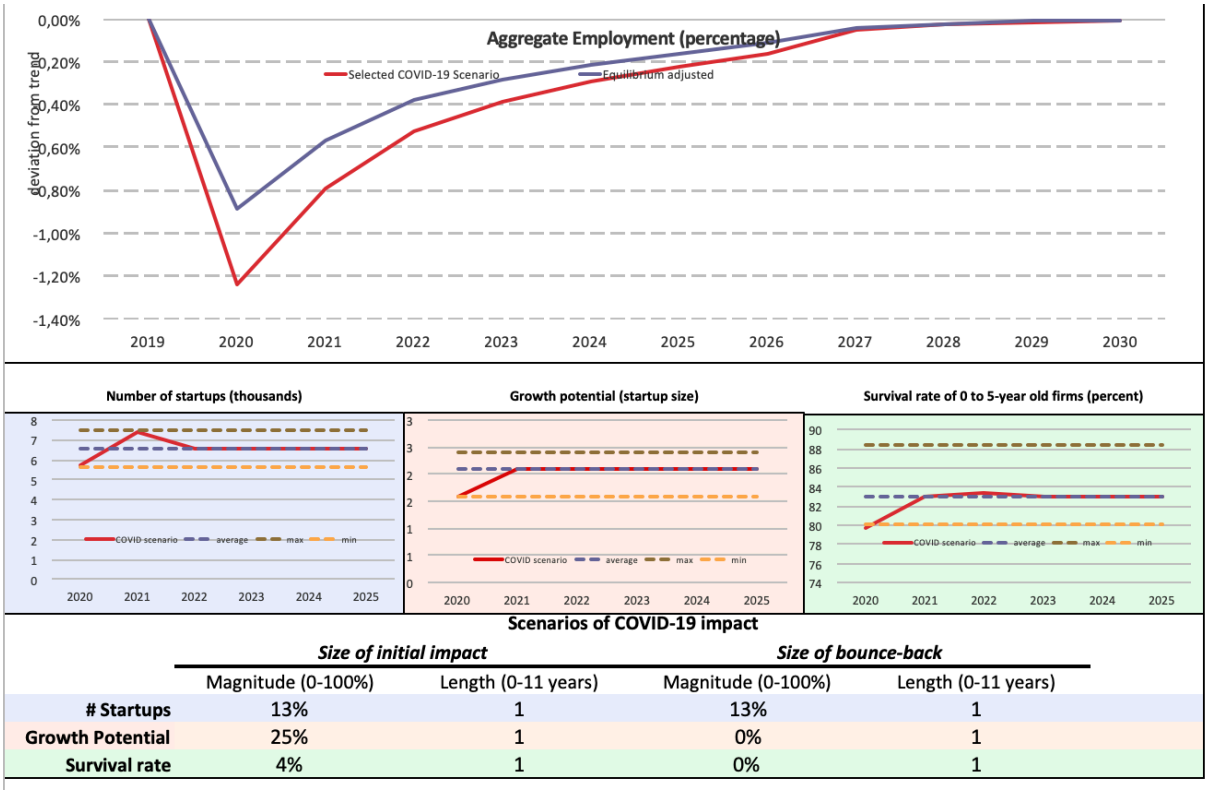
	All	Industry	Manufacturing	Services
Cumulative employment loss	29 k	8 k	7 k	17 k
# Start-ups	27%	44%	46%	53%
Growth potential	52%	21%	18%	12%
Survival rate	21%	35%	36%	35%

Source: JRC, EU start-up calculator, Slovenia, 2020.

Note(1): The sector aggregate reflects the classifications available in Eurostat – i.e. all business economy except the activities of holding companies, the industrial sector except construction, and the service sector of the business economy except activities of holding companies.

Hence, a disruption to start-ups and other young firms affects the service sector relatively strongly causing a loss of aggregate employment of more than 17,000 jobs (Table XXVII). In all the three sectors more than 40% of the job loss is attributed to the decline in the number of start-ups plays a prominent role, seconded by the decline in the survival rate of young firms. These considerations are indicative that policy targeted to support firms to tackle survival challenges and support entry could have a significant effect in mitigating the impact that the COVID-19 pandemic will have on aggregate employment.

Subdued firm entry in 2020 due to the COVID-19 crisis may be the result of a postponement of start-up decisions with more firm entry in 2021 especially if supported by specific policies targeted to start-ups that could reduce the entry barriers, promote innovation and relax financial constraints. The optimistic outlook for a bounce-back in the number of start-ups is simulated in Figure 34 where, after the initial negative shock, the number of start-ups is increased in 2021 to the *maximum* level registered in the time series. After an initial sharp decline in aggregate employment, the increased number of start-ups entering in 2021 causes an improvement of the employment trend and a lower cumulative job loss totalling to about 20,850. Thanks to the better outlook aggregate employment reaches its pre COVID-19 level by 2028.



Scenarios of COVID-19 impact

	Size of initial impact		*Size of bounce-back*	
	Magnitude (0-100%)	Length (0-11 years)	Magnitude (0-100%)	Length (0-11 years)
# Startups	13%	1	13%	1
Growth Potential	25%	1	0%	1
Survival rate	4%	1	0%	1

Figure 34. Bounce-back scenario in the number of firms, results for aggregate employment - Slovenia

Source: EU start-up calculator, Slovenia, 2020.

Note(1): The simulation on aggregate employment considers a shock on the three margins equal to their sample *minima* and of the duration of one year. The bounce-back in the number of start-ups is assumed to take place in 2021, to be equal to the sample *maximum* and of one year duration. Firms older than 15 are unaffected by the three margins and their time-path does not quantitatively affect the analysis. The blue line represents the impact on aggregate employment taking into account general equilibrium effects.

5 Conclusions

The COVID-19 crisis is likely to heavily affect start-ups and young firms, and ultimately also aggregate employment. To understand the impact, we developed the EU start-up calculator. This is an empirical tool which allows to assess the medium-term impact that the COVID-19 pandemic has on aggregate employment via the destruction of start-up activities varying three margins: (i) the number of start-ups, (ii) the growth potential and (iii) the survival rate. Different scenarios have been analysed for the business economy, the industry, manufacturing and service sector of Bulgaria, Croatia, Czechia, Luxemburg, the Netherlands, Poland, Romania, Slovakia and Slovenia. This work follows closely a first report on the "EU start-up calculator" which analyses the start-up dynamics for Austria, Belgium, Germany, Hungary, Italy and Spain (Benedetti Fasil, Sedláček and Sterk (2020a)) and a second report which analyses Denmark, Estonia, Finland, France, Latvia, Lithuania, Portugal and Sweden (Benedetti Fasil, Sedláček and Sterk (2020b)).

A strong but short lived-crisis may result in important and persistent job losses in all the countries that range between 0.25 (Luxemburg) to 6.9% (Slovakia) in 2020 and adds to a cumulative employment loss for the period 2020-2030 that ranges between 5,600 (Luxemburg) to 2179,000 (Poland). These losses seem to be particularly high in countries and sectors characterized by a high firm turnover and that rely on start-ups and young firms for job creation, e.g. Bulgaria, Croatia, Poland, Romania and Slovakia as well as the service sector rather than the industry and manufacturing sector. As for the margins considered, in most countries the deterioration of the survival rate of young firms seems to play an important role in driving employment, seconded by the number of new entrants. The exceptions are the Netherlands and Slovenia, where the decline in the growth potential accounts for more than half of the aggregate employment loss, and Luxemburg where the lion share in explaining the employment loss is played by the decline in the number of start-ups.

Notwithstanding the significant economic disruption caused by the COVID-19 pandemic, the medium-term effects on aggregate employment may be significantly mitigated by policies aimed at supporting young firms and incentivizing the creation of new ones. This represents a positive factor as this group of firms, i.e. start-ups and young firms, is easily identifiable by policy makers and hence represents an easy target for policy interventions. With this in mind we explored the potential impact that policies may have on aggregate employment. In particular, we simulated bounce-back scenarios where the number of firms entering the economy rapidly increases in 2021. In every country, the outlook is significantly improved, the recovery is faster and the aggregate job loss is lower. Hence, policy makers may have amble margin of manoeuvre to alleviate the crisis with a mix of policies that while being targeted may also be efficient.

Along these lines, the European Union has launched a series of guidelines and instruments, such as InvestEu, the European Innovation Council and, as a result of the COVID-19 pandemic, the Recovery Resilience Facility. One of the goals of these instruments is to support the creation of a vibrant and more resilient entrepreneurial ecosystem with particular attention to promote start-ups and young firms. The interventions include access to liquidity and funding to start-ups and young firms in the forms of grants, equity or zero-interest loans especially targeted to scale-ups, to promising innovators and R&D investments, and to support young enterprises' needs. Also the use of in-kind support, such as training programs, creation of network opportunities with peer-entrepreneurs, customers and suppliers to rebuild the value chain, and the promotion of knowledge transfer from applied research to the entrepreneurial ecosystem are considered as priorities. Focus is also put on the creation of new opportunities via the promotion of digitalization and of the green transition. Finally, there is the indication to reduce and simplify the red-tape costs upon entry and the general administrative burden that firms face. If policy makers will be able to design and target these instruments to promote start-ups and young firms, then the recovery from the COVID-19 disruption will be considerably faster and the outlook much more positive. We postpone to further research the assessment on how these interventions

may affect the three margins that govern the scenario creation of the start-up calculator and ultimately the impact that they will have on aggregate employment.

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Appendix

Appendix I. Figures

The introduction avails of a series of figures summarising summary statistics for start-ups and young firms, their importance for job creation and timely data on the registration of new companies in the first two quarters of 2020 with respect to the same period in 2019. This Appendix proposes the same figures for a larger set of Member States which have available data.

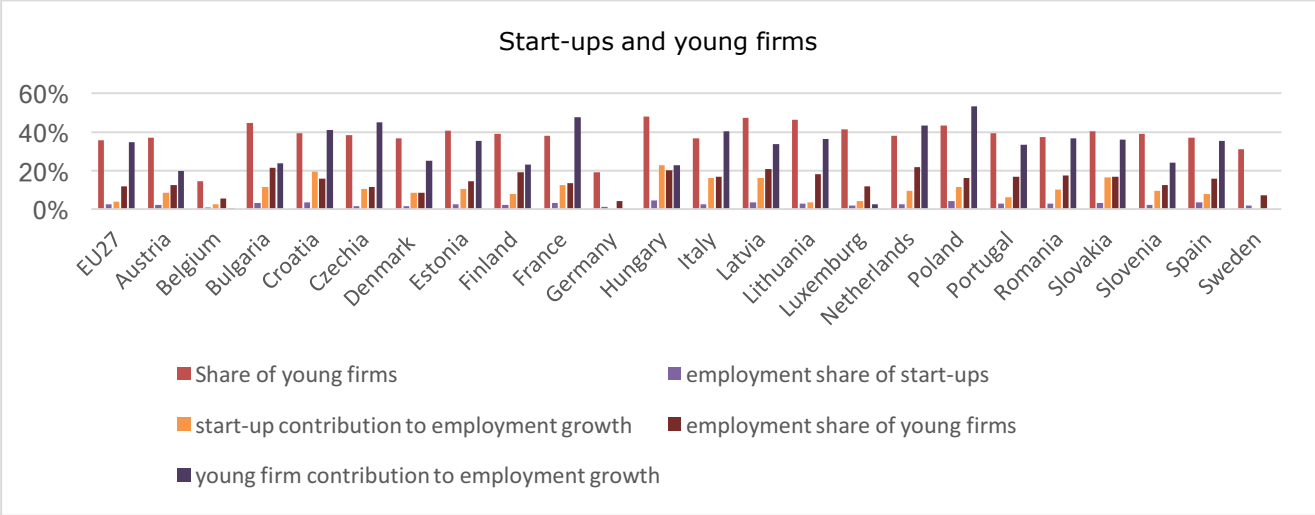

Figure A1. Importance of start-ups and young firms for aggregate employment

Source: JRC, Eurostat, Business Demography dataset, 2020.

Note(1): The time series for the EU27, Denmark and Finland, Bulgaria, Croatia, Poland and Slovakia is between 2012 and 2017, for Austria, Belgium, Czechia, Estonia, France, Latvia, Luxemburg, Netherlands, Poland, Hungary, Italy, Portugal, Romania, Slovenia and Spain between 2008 and 2017, for Lithuania from 2009 to 2017. The Business Demography dataset for Germany and Sweden does not have enough data to compute the start-up and young firm contribution to growth. Hence, this is omitted in the Figure. For the other statistics the time series is between 2012 and 2017.

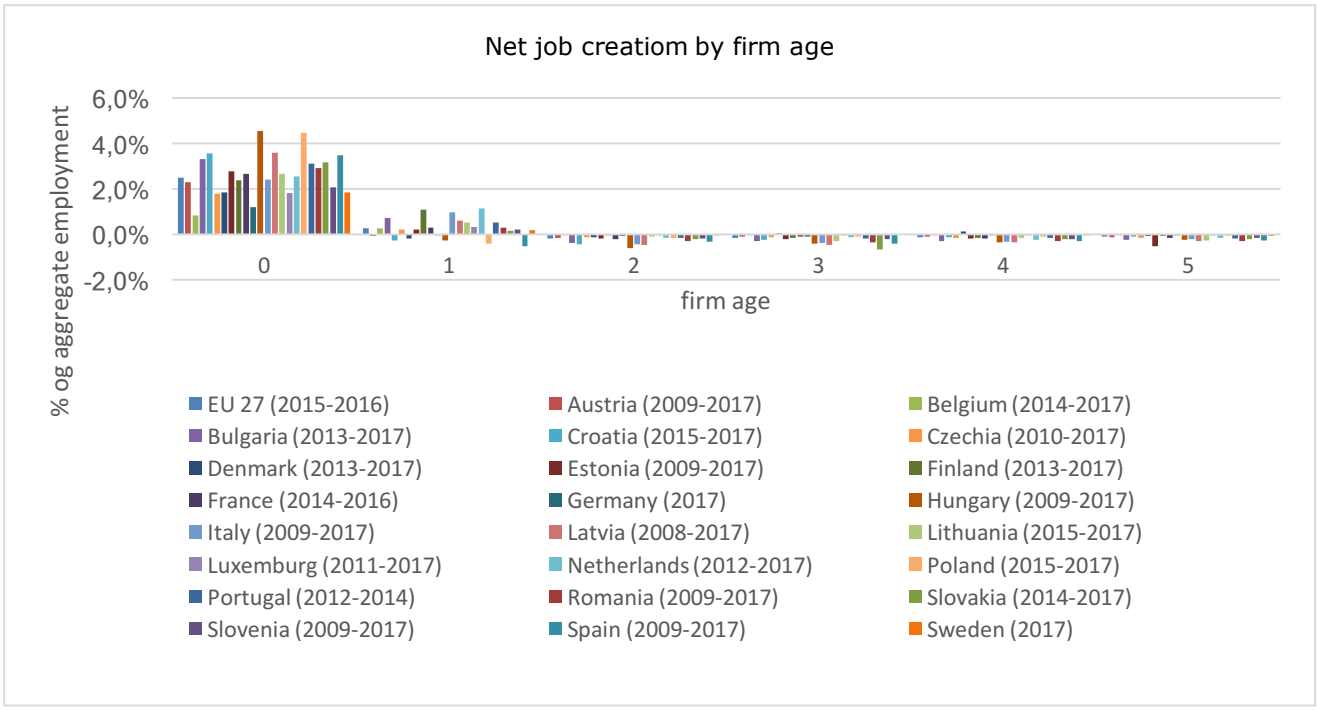

Figure A2. Importance of start-ups for job creation

Source: JRC, Eurostat, Business Demography dataset, 2020.

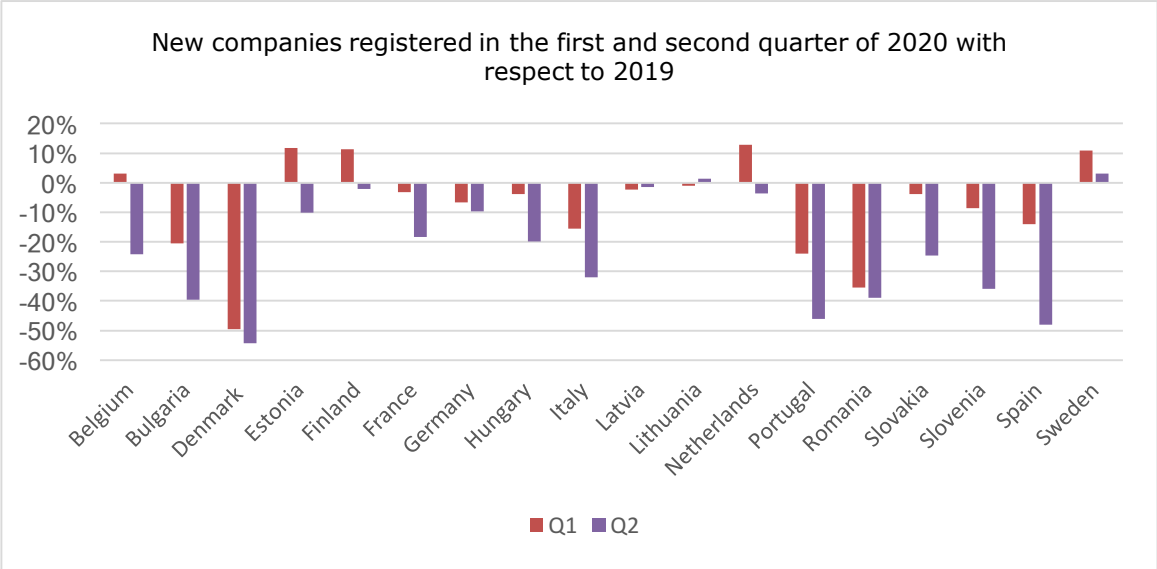

Figure A3. Annual change in the number of new companies registered in the first and second quarter of 2020 with respect to the first and second quarter of 2019 (percentage)

Source: JRC, data from Statistics Belgium (STABEL), the Bulgarian National Statistical Institute (BNSI), the Danish Statistical Institute (DST), Statistics Estonia (SE), Statistics Finland (SF), the National Institute of Statistics and Economic Studies (Insee), the Federal Statistical Office of Germany providing preliminary data (DESTATIS), the Hungarian Central Statistical Office (KSH), the Italian Association of the Chamber of Commerce (IC), the Enterprise Register of Latvia (https://www.ur.gov.lv/en/statistics/), Statistics Lithuania (https://www.stat.gov.lt), Netherlands StatLine (CBS), the Portuguese National Statistical Institute (INE), the Romanian National Trade Statistical Office (ONRC), the Slovak statistical office (www.statistics.sk), the business register of Slovenia (AJPES), the Spanish National Statistical Institute (INE) and the Swedish Registration Offices of Companies (Bolagsverket).

Note(1): The data, which come from national statistical offices or enterprise registers, are not harmonized across countries. As a consequence, Figure 3 does not allow for quantitative cross-country comparisons *per se*. Nevertheless, it is useful to visualize the different impact that COVID-19 has had across countries in terms of start-up creation. Finally, we were unable to obtain data for Austria, Croatia, Czechia, Luxemburg and Poland.

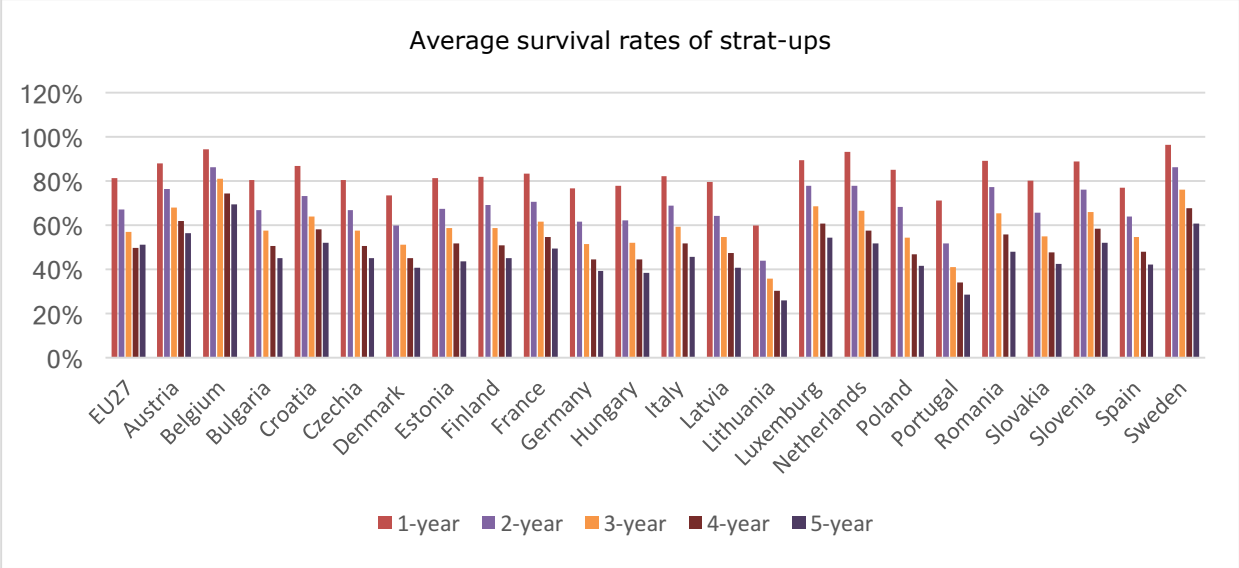

Figure A4. Y-o-y survival rate of start-ups

Source: JRC, Eurostat, Business Demography dataset, 2020.

Note(1): The Eurostat database provides the y-o-y survival rates for start-ups after one, two, three, four and five years of activities. The plotted percentages are the averages of the period from 2013 to 2017 for the EU 27 and Croatia, from 2008 to 2017 for Estonia, France, Latvia, from 2008 to 2018 for Austria, Belgium, Bulgaria, Czechia, Finland, France, Germany, Hungary, Italy, Lithuania, Luxemburg, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden and from 2009 to 2017 for Denmark.

Appendix II. Interpolation, extrapolation and creation of scenarios

In Eurostat for firms of age $a = \{0,1,2,3,4,5\}$ in year $t \in [2008\text{-}2017]$ is directly observable the number of firms $n_{a,t}$, firm size $s_{a,t}$ and the survival rate $1\text{-}x_{a,t}$. However, firms older than 5 are grouped together in Eurostat. Hence, it is necessary to interpolate information for each of the individual age categories. Two inputs to the calculator are the profiles of average size and the survival rates by age in the baseline scenario (i.e. without shock), for firms up to age 15. For firms up to age 5, we measure directly in the data as averages over the sample period. For older firms, we assume a functional form for both profiles and fit these to the available data. Specifically, for the exit rate we assume the following functional form:

$$x_a = \beta_0 + \beta_1 \left(\frac{\exp \beta_2}{1+\exp \beta_2}\right)^{\alpha-1}.$$

This implies a smooth profile, gradually decaying from an initial point $x_{a=1} = \beta_0 + \beta_1$ to a limit point $x_{a\to\infty} = \beta_0$. The parameter β_2 controls the speed of decay.

Regarding the average size profile we assume a simple linear form:

$$n_a = \gamma_0 + \gamma_1 a.$$

The functional forms for these two profiles capture well patterns documented using data

sets for which exit rates can be computed for all age groups (such as the US Longitudinal Business Database, see e.g. Pugsley, Sedláček and Sterk (2017).

To estimate the parameters of these profiles we use a minimum distance estimator, targeting the following outcomes which we can observe in the data: (i) the average exit rate by age, for firms up to age 5, (ii) average size of firms by age, for firms up to age 5, (iii) the average exit rate among all firms, and (iv) average size among all firms. Note that given a profile for the exit rate by age, one can compute the firm age distribution, and then the average exit rate by weighting the exit rates by age with the firm shares in each age bin. Then, given the age distribution and the average size profile by age, one can compute average size across all firms. The estimation is implemented in MatLab.

In order to extrapolate the necessary data between 2017 and 2019, we assume that firm size by age and exit rates by age (up to age 15), and the number of start-ups, all linearly converge to their 2008-2017averages:

$$x_{a,2017+\tau} = x_{a,2017} + \frac{\tau}{2}\left(\bar{x}_a - x_{a,2017}\right),$$

$$s_{a,2017+\tau} = s_{a,2017} + \frac{\tau}{2}\left(\bar{s}_a - s_{a,2017}\right),$$

$$n_{0,2017+\tau} = n_{0,2017} + \frac{\tau}{2}\left(\bar{n}_0 - n_{0,2017}\right).$$

for τ = 1, 2 and a = 1, 2,…, 15, and where $\bar{x}_a$, $\bar{s}_a$, and $\bar{n}_0$ denote the 2008 to 2017 averages of age specific exit rates, firm sizes and the number of start-ups, respectively. Using the above, we can then recover the number of firms for the ages of 1 to 15 as $n_{a,t} = n_{a-1,t-1}\left(1 - x_{a,t}\right)$, *for* a = 1, 2, …, 15 and t = 2018, 2019.

In order to compute aggregate employment, it is also necessary to assume a particular time-path for employment of 16+ year old firms. However, because 16+ year old firms are unaffected by our scenarios, the particular time-path is quantitatively unimportant for the results which are reported in deviations from the assumed trend. For this reason, we simply assume that employment in 16+ year old firms stays fixed at its 2017 level.

Having the above information, we are ready to conduct scenarios starting in 2020 and running through to 2030. We consider three types of margins: (i) changes in the number of start-ups, (ii) changes in growth potential and (iii) changes in survival rates. To be concrete, for a given scenario, let us denote the initial percentage decrease in the number of start-ups, the growth potential of start-ups and the survival rate of young firms by $\zeta_j \in (0,1)$ where j = {n, s, x}, respectively. Let us further denote the duration of these effects by $\tau_j > 0$, where j = {n, s, x}, respectively. The given scenarios are then given by:

$$n_{0,2019+t} = n_{0,2019}(1 - \zeta_n), \qquad \text{for } t = 1, \dots, \tau_n,$$

$$s_{a,2019+t+a} = s_{a,2019}(1 - \zeta_s), \qquad \text{for } t = 1, \dots, \tau_s \text{ and } a = 0, 1, 2, \dots, 15,$$

$$x_{a,2019+t} = x_{a,2019}(1 - \zeta_x), \qquad \text{for } t = 1, \dots, \tau_x \text{ and } a = 1, 2, \dots, 15.$$

The calculator can also accommodate bounce-back scenarios. These are always defined as certain values above the 2008-2017 averages of the number of start-ups, average sizes and survival rates of young firms. Recall that all these margins converge precisely

to the respective 2008-2017 averages by 2019.

Specifically, let us denote the percentage increase (above the respective long-run average) in the bounce-back scenario related to the number of start-ups, the growth potential of young firms and their survival rates by χ_j , where j = {n, s, x}, respectively. Furthermore, let us denote the length of the bounce-back period by τ_j, where j = {n, s, x}, respectively. The given bounce-back scenarios are then given by

$$n_{0,2019+\tau_n+t} = n_{0,2019}(1-\chi_n), \qquad \text{for } t = 1, \dots, \tau_n,$$

$$s_{a,2019+\tau_s+t+a} = s_{a,2019}(1-\chi_s), \qquad \text{for } t = 1, \dots, \tau_s \text{ and } a = 0, 1, 2, \dots, 15,$$

$$x_{a,2019+\tau_x+t} = x_{a,2019}(1-\chi_x), \qquad \text{for } t = 1, \dots, \tau_x \text{ and } a = 1, 2, \dots, 15.$$

Appendix III. Adjusting for general equilibrium effects

The calculator *per se* is an accounting tool that abstracts from potential general equilibrium effects. To capture the partial reallocation of labour towards surviving firm, the calculator is embedded in a canonical model with firm heterogeneity. In what follow, we briefly describe the model economy and it contribution to the calculator.

In the model, there is a measure *M* of heterogeneous firms.[34] Let the production

function of firm *i* be given by:

$$y_i = z_i n_i^{\alpha}$$

where y_i is the firm's output, n_i its employment level, z_i is the firm's productivity level, and $\alpha \in (0,1)$ is the elasticity of production with respect to labour input.[35] The wage per employee is taken as given by firms, and denoted by *w*. The firm chooses its level of employment in order to maximize profits, given by $\pi_i(n) = z_i n_i^{\alpha} - w n_i$. This implies

the following familiar solution for labor demand by firm *i*:

$$n_i = (z_i)^{\frac{1}{1-\alpha}} \left(\frac{w}{\alpha}\right)^{\frac{1}{\alpha-1}}$$

Aggregating over all firms, aggregate labor demand is given by:

$$\mathrm{N} = M \left(\frac{w}{\alpha}\right)^{\frac{1}{\alpha-1}} \int z^{\frac{1}{1-\alpha}} dF(z)$$

where $\chi \equiv \int z^{\frac{1}{1-\alpha}} dF(z)$, with F is the CDF of the productivity distribution. Taking logs and

[34] Although the model is dynamic, it can be described entirely in static terms, hence we omit time subscripts.

[35] We abstract from capital for simplicity. Augmenting the model with capital would not change any of our results.

differentiating (keeping idiosyncratic productivities constant), we can decompose changes in aggregate labour demand as:

$$d\ln N = \left(d\ln M + d\ln \chi + \frac{1}{\alpha - 1} ln\ w\right) \quad (1)$$

The first two terms reflect changes in, respectively, the number of firms and their growth potential (productivity), whereas the third term captures equilibrium effects due to wage conditions.[36] Equation (1) can be understood as an aggregate labour demand curve, which is shifted by the number of firms and their growth potential. To close the model, we need to specify how labour supply is determined. We assume there is a representative household with Greenwood-Hercowitz-Huffmann preferences. Specifically, the household's level of utility is given by:

$$\mathrm{U}(C,N) = \left(C - \mu \frac{N^{1+k}}{1+k}\right)^{1-\sigma}$$

where C denotes consumption and $\kappa, \mu, \sigma > 0$ are preference parameters. The household chooses C and N to maximize utility, subject to a budget constraint given by $C = wN + \Pi$, where Π are aggregate firm profits. Utility maximization implies the following labour supply curve: $\mu N^{\kappa} = w$. Taking logs and differentiating gives the labour supply schedule:

$$d\ln N = \frac{1}{\kappa} ln\ w \quad (2)$$

Combining the labour demand and supply schedules, Equations (1) and (2), we can solve for the equilibrium level of aggregate employment:

$$d\ln N = \psi\ (d\ln M + d\ln \chi) \quad (3)$$

Equation (3) expresses aggregate employment (in deviation from some baseline trend) as a function of the number of firms and their growth potential. The latter two are outputs from the calculator, while $\psi = \frac{1}{1-k\varepsilon_{nw}} \in (0,1)$ is the equilibrium dampening effect, where $\varepsilon_{nw} = \frac{1}{\alpha-1}$ is the wage elasticity of labour demand and $1/k$ is the Frisch elasticity of labour supply. Based on these two parameters and the output from the calculator, we can thus compute the equilibrium change in aggregate employment from Equation (3). Using elasticities consistent with the literature and with the values adopted by the European Commission QUEST and RHOMOLO models, we set the labour supply elasticity, $1/k$, at 0.25 and the labour demand elasticity, ε_{nw}, at -0.1. These elasticities result in a dampening effect of 29%.

[36] Other sources of equilibrium dampening could derive from endogenous entry and exit, which we abstract from here.

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