A First Year's Impact of the Pandemic on the Czech Entrepreneurial Activity

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Abstract

Every crisis affects entrepreneurial activity; for some entrepreneurs, it is an opportunity for a new start; others are forced to shut down their businesses. This study aimed to analyze the effect of the global coronavirus (so-called COVID-19) pandemic on Czech entrepreneurial activity. The article exploits the administrative data covering business demographics of seventy-seven Local Administrative Units (LAU1) regions over the years 2008-2020. Data were obtained from the Czech Statistical Office. The study provides insights into the short term effects of the pandemic, i.e. one year after. The results from the panel regression models and placebo tests comparing forecasted values of new businesses registrations and closures with actual values obtained after the end of 2020 do not show that there would be a significant drop in the Czech entrepreneurial activity. On the opposite, the data indicate that the Czech entrepreneurial activity grew and even increased compared with 2019. However, the obtained results need to be interpreted with caution, as many factors influenced Czech businesses' development. Specifically, we mention the past economic growth, the introduction of public entrepreneurship and SME policy instruments and financial back-ups of the business owners. There are several implications of the conducted research. For instance, there is a need to observe the long-term effects of the pandemic on business demography and its structure. We propose to study changes in bankruptcy rates in the most harmed sectors such as tourism, hospitality, culture or sport and compare them with sectors that could easier transfer their business activities online.

Keywords: entrepreneurial activity; business demographics; global pandemic; crisis; COVID-19; forecasting; econometric analysis

Introduction

The population of economically active businesses and self-employed persons, i.e., entrepreneurial activity, is continuously influenced by many identified determinants both on the supply and demand sides [*Freytag, Thurik,* 2007; *Urbano et al.,* 2019]. Crises, economic shocks, and natural disasters belong to external factors that have the potential and power to affect the levels and structure of entrepreneurial activity [*Santos et al.,* 2017; *Doern et al.,* 2019].

At the end of 2019, such an event occurred. The coronavirus (so-called COVID-19) started spreading from Wuhan, China to other parts of the world so quickly that World Health Organization (2020) declared the COVID-19 pandemic on March 11, 2020[1]. As a result, governments responded with numerous restrictive actions, which also affected entrepreneurs, who had to move their businesses online, adapt to governmental restrictions, or close their businesses temporarily or entirely. Some individuals took the pandemic as an opportunity to establish a new venture or innovate the existing business despite the adverse conditions, others as a signal to completely shut down [*Kuckertz et al.,* 2020; *Ratten,* 2020; *Croteau et al.,* 2021; *Dvoulety et al.,* 2021a].

However, has the pandemic influenced the overall levels of entrepreneurial activity? Did it result in decreased levels of the population engaged in entrepreneurship and self-employment? Although the pandemic is not yet over, we may already quantify its initial and short-term effects. This is the main aim of the paper. This study analyzes how was the overall population of the Czech enterprises was influenced by the pandemic in the short term, i.e., one year after the beginning of the crisis. The Czech Republic serves as an example of a small open Central European economy with above-average entrepreneurship levels [*Dvoulety,* 2019; *Hamplová et al.,* 2021]. However, the introduced empirical approach may be used by scholars from other countries who are interested in quantifying the effects of the global pandemic upon entrepreneurial development. The research results have value also for policymakers, who invested considerable efforts and financial resources toward supporting entrepreneurship in times of crisis over the past year [*Żak, Garncarz,* 2020; *Brown et al.,* 2020; *Pedauga et al.,* 2021]. The empirical approach used in this paper is based on the application of econometric, statistical, and forecasting techniques (specifically panel regression analysis and paired t-tests)

on the level of regional Local Administrative Units (LAU1) and official business demographics data obtained from the Czech Statistical Office.

Data and Methods

The most significant restrictions imposed upon the Czech economy started in late March 2020 after the declaration of a global pandemic [*Hedvičáková, Kozubíková,* 2021], which was characteristic of other countries [*Rashid, Ratten,* 2021; *Storr et al.,* 2021; *Apostolopoulos et al.,* 2021]. The restrictions included mainly the closure of shops and businesses, schools, accommodation facilities, the restriction of free movement, and the obligation to wear a mask covering both the mouth and nose [*Dvorak et al.,* 2021].

This study is based on organizational statistics administrative data obtained from the Czech Statistical Office (2021). The available data include information on the overall number of economically active entities, the number of newly registered businesses, and business closures. We managed to collect data for the period of years 2008-2020. This allows us to observe changes in Czech entrepreneurial activity after the first year of the global pandemic.

Initially, we may see the year-to-year changes in the overall levels of activity. In 2019, the Czech Statistical Office's (2021) data[2] show that there were 1,530,749 enterprises with reported economic activity. This number even increased to 1,576,331 at the end of 2020, so we do not see any significant drop in the overall activity level, but rather the opposite.

It is worth noting that the overall levels of entrepreneurial activity cannot provide us with a more complex picture of what is happening, so we need to dive deeper into its inflows and outflows. The registrations of new businesses represent the inflows and outflows include closures of existing enterprises [*Iversen et al.,* 2007; *Congregado,* 2007]. Therefore, we observe both inflows and outflows of Czech entrepreneurial activity at the Local Administrative Unit – LAU1[3] levels to obtain a more detailed picture. The Czech Republic consists of seventy-seven LAU1 districts (Figure 1 shows the districts on the map) that are not frequently used for analysis due to the lack of data [*Baštová et al.,* 2011; *Dvoulety,* 2017]. Table 1 shows summary statistics for both respective variables, i.e., the number of newly registered enterprises and the number of officially closed businesses in the year at the LAU1 level.

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[1] https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19, accessed 04.06.2021.

[2] https://www.czso.cz/csu/czso/organizational-statistics, accessed 04.06.2021.

[3] https://ec.europa.eu/eurostat/web/nuts/local-administrative-units, accessed 04.06.2021.

Figure 1. **Map of the Czech Republic showing LAU1 regions**

Source: Wikimedia Commons (2021), available under the Creative Commons License CC0. https://cs.wikipedia.org/wiki/ Okresy_v_%C4%8Cesku#/media/Soubor:Okresy_%C4%8CR_2007.PNG, accessed 04.06.2021.

The empirical approach is based on applying econometric, statistical, and forecasting techniques *to analyze the impact of the pandemic upon the inflows into and outflows from entrepreneurship after the end of the first year.* The approach includes the following steps:

1. First, we estimate LAU1 panel regression models on both flow-capturing variables over the years 2008-2020 to see if 2020 values deviate from the long-term trend.

2. We proceed by estimating both models on a reduced sample of the years 2008-2019 and forecast the values of new registrations and business closures in 2020.

3. Once evaluating the quality of the forecasted values in 2020, we employ the paired t-tests (placebo test) to see whether the predicted values differ from the actual values.

Results

We estimate regression models based on a balanced longitudinal sample of seventy-seven districts over the years 2008-2020. We use the least-squares dummy variables (LSDV) estimator, which is suitable for a relatively stable panel [*Verbeek,* 2008]. Thus, the estimated models include district and year dummies. All reported models were estimated with robust standard errors. As a robustness check, there are, for each of the two dependent variables, two estimated models presented in Table 2. The robustness check included the logarithmic transformation of dependent variables to make the variance more stable. The obtained results are stable and do not significantly differ between Models 1 and 2 and Models 3 and 4, respectively. Therefore, the main findings can be found in Model 1 for new business registrations and Model 3 for business closures.

Furthermore, the results confirm that the inflows and outflows depend on time and location, as many scholars emphasized in their publications [*Audretsch et al.,* 2012; *Muñoz, Kimmitt,* 2019]. Notably, we see that there were slightly lower registrations of new businesses and more business closures in 2020 when compared with the reference year;

Table 1. **Summary statistics of LAU 1 data for years 2008-2020**

Variable/indicator	Mean	Median	Minimum	Maximum	Number of Observations
New Businesses Registrations	1358.7	840.0	248.0	29 801.1	1001
Business Closures	956.2	625.0	148.0	32 440	1001
Source: Own elaboration based on the Czech Statistical Office (2020) data.					

Model number	(1)	(2)	(3)	(4)
Independent variables/ Dependent variables	**New Businesses Registrations**	**Log(New Businesses Registrations)**	**Business Closures**	**Log(Business Closures)**
		LAU1 Regions		
Benesov	–26128.9*** (430.3)	–3.575*** (0.0429)	–13141.4*** (1762.2)	–3.121*** (0.108)
Beroun	–26132.0*** (430.8)	–3.575*** (0.0441)	–13271.4*** (1761.3)	–3.240*** (0.0891)
Blansko	–26139.2*** (431.3)	–3.583*** (0.0491)	–13232.4*** (1762.0)	–3.145*** (0.0887)
Brno-mesto	–21360.9*** (446.6)	–1.584*** (0.0535)	–10621.5*** (1763.8)	–1.415*** (0.0961)
Brno-venkov	–25086.3*** (430.8)	–2.708*** (0.0436)	–12589.4*** (1761.8)	–2.401*** (0.0930)
Bruntal	–26202.2*** (430.4)	–3.674*** (0.0425)	–13201.1*** (1763.2)	–3.091*** (0.109)
Breclav	–25948.7*** (430.7)	–3.359*** (0.0432)	–12926.2*** (1771.8)	–2.827*** (0.117)
Cheb	–26119.8*** (432.4)	–3.594*** (0.0624)	–12887.7*** (1773.5)	–2.874*** (0.145)
Chomutov	–25943.9*** (431.0)	–3.366*** (0.0502)	–12895.6*** (1761.3)	–2.694*** (0.0917)
Chrudim	–26024.7*** (430.8)	–3.445*** (0.0454)	–13144.4*** (1761.9)	–3.013*** (0.0902)
Domazlice	–26471.3*** (430.5)	–4.184*** (0.0451)	–13477.3*** (1762.0)	–3.724*** (0.0985)
Decin	–25989.2*** (430.5)	–3.417*** (0.0476)	–12951.0*** (1761.7)	–2.786*** (0.0965)
Frydek-Mistek	–25204.8*** (431.1)	–2.772*** (0.0495)	–12703.5*** (1763.2)	–2.488*** (0.105)
Havlickuv Brod	–26147.5*** (430.6)	–3.599*** (0.0424)	–13316.5*** (1761.8)	–3.323*** (0.0922)
Hodonin	–25694.2*** (430.3)	–3.118*** (0.0420)	–12839.3*** (1762.8)	–2.667*** (0.0972)
Hradec Kralove	–25344.1*** (431.8)	–2.866*** (0.0445)	–12673.3*** (1762.4)	–2.481*** (0.0887)
Jablonec nad Nisou	–26148.6*** (430.7)	–3.607*** (0.0442)	–13172.9*** (1761.7)	–3.065*** (0.0882)
Jesenik	–26543.8*** (431.0)	–4.366*** (0.0421)	–13564.5*** (1762.9)	–4.032*** (0.105)
Jihlava	–25966.9*** (430.7)	–3.381*** (0.0438)	–13254.2*** (1762.6)	–3.178*** (0.0987)
Jindrichuv Hradec	–26169.8*** (430.4)	–3.633*** (0.0436)	–13260.2*** (1763.4)	–3.187*** (0.0912)
Jicin	–26233.2*** (431.1)	–3.725*** (0.0473)	–13322.6*** (1762.2)	–3.348*** (0.0903)
Karlovy Vary	–25721.2*** (441.8)	–3.178*** (0.0642)	–12801.5*** (1763.3)	–2.628*** (0.103)
Karvina	–25210.3*** (430.9)	–2.779*** (0.0422)	–12446.8*** (1763.3)	–2.257*** (0.106)
Kladno	–25565.4*** (431.0)	–3.018*** (0.0427)	–12726.9*** (1761.0)	–2.522*** (0.0887)
Klatovy	–26260.2*** (430.5)	–3.775*** (0.0460)	–13286.8*** (1761.8)	–3.263*** (0.0920)
Kolin	–26111.2*** (430.7)	–3.548*** (0.0438)	–13200.8*** (1762.4)	–3.097*** (0.0895)
Kromeriz	–26108.3*** (430.2)	–3.555*** (0.0449)	–13063.2*** (1763.2)	–2.904*** (0.0938)
Kutna Hora	–26330.5***	–3.881***	–13224.4***	–3.189***
Liberec	–25302.5*** (431.9)	–2.840*** (0.0414)	–12473.8*** (1778.7)	–2.450*** (0.125)
Litomerice	–26001.9*** (430.5)	–3.422*** (0.0441)	–12893.5*** (1763.4)	–2.784*** (0.104)
Louny	–26259.5*** (431.2)	–3.767*** (0.0531)	–13196.3*** (1760.7)	–3.158*** (0.0980)
Mlada Boleslav	–25886.9*** (434.6)	–3.326*** (0.0596)	–13070.9*** (1762.6)	–2.969*** (0.109)
Most	–26007.2*** (431.9)	–3.429*** (0.0570)	–13171.6*** (1762.6)	–3.054*** (0.0993)
Melnik	–26017.8*** (430.3)	–3.436*** (0.0410)	–13065.7*** (1761.0)	–2.921*** (0.0924)
Novy Jicin	–25861.2*** (430.4)	–3.271*** (0.0414)	–12997.5*** (1763.1)	–2.790*** (0.102)
Nymburk	–26122.8*** (430.8)	–3.564*** (0.0429)	–13232.8*** (1760.8)	–3.161*** (0.0892)
Nachod	–26070.2*** (430.3)	–3.497*** (0.0416)	–13169.8*** (1761.6)	–3.096*** (0.0971)
Olomouc	–24918.2*** (431.4)	–2.617*** (0.0427)	–12575.5*** (1764.6)	–2.383*** (0.102)
Opava	–25627.8*** (430.4)	–3.065*** (0.0412)	–12780.4*** (1765.0)	–2.568*** (0.126)
Ostrava-mesto	–23658.2*** (434.0)	–2.122*** (0.0445)	–11467.5*** (1768.6)	–1.720*** (0.115)
Pardubice	–25344.4*** (431.3)	–2.864*** (0.0421)	–12664.5*** (1761.3)	–2.455*** (0.0895)
Pelhrimov	–26304.5*** (430.4)	–3.841*** (0.0452)	–13403.5*** (1763.3)	–3.517*** (0.0991)
Plzen-jih	–26460.5*** (430.7)	–4.149*** (0.0433)	–13470.5*** (1761.4)	–3.751*** (0.0979)
Plzen-mesto	–24768.2*** (466.3)	–2.581*** (0.0644)	–12235.0*** (1769.2)	–2.180*** (0.109)
Plzen-sever	–26329.1*** (430.3)	–3.883*** (0.0470)	–13416.4*** (1762.1)	–3.595*** (0.0987)
Prachatice	–26484.5*** (430.9)	–4.210*** (0.0463)	–13440.2*** (1764.2)	–3.600*** (0.0967)
Praha-vychod	–25076.3*** (431.0)	–2.700*** (0.0460)	–12852.8*** (1761.1)	–2.656*** (0.0916)
Praha-zapad	–25333.7*** (431.3)	–2.853*** (0.0493)	–12741.1*** (1765.1)	–2.634*** (0.121)
Prostejov	–26134.2*** (430.4)	–3.583*** (0.0414)	–13174.9*** (1765.8)	–3.070*** (0.107)
Pisek	–26321.5*** (430.5)	–3.867*** (0.0423)	–13304.3*** (1762.6)	–3.283*** (0.0937)
Prerov	–26018.0*** (430.4)	–3.439*** (0.0419)	–13063.5*** (1764.8)	–2.896*** (0.107)

Table 2 continued				
Model number	**(1)**	**(2)**	**(3)**	**(4)**
Independent variables/ Dependent variables	**New Businesses Registrations**	**Log(New Businesses Registrations)**	**Business Closures**	**Log(Business Closures)**
Pribram	–25944.2*** (430.0)	–3.357*** (0.0414)	–13093.0*** (1760.7)	–2.971*** (0.0936)
Rakovnik	–26458.0*** (430.5)	–4.157*** (0.0502)	–13421.8*** (1762.7)	–3.570*** (0.0926)
Rokycany	–26544.6*** (430.4)	–4.383*** (0.0491)	–13523.2*** (1762.2)	–3.900*** (0.0985)
Rychnov nad Kneznou	–26346.2*** (430.4)	–3.917*** (0.0437)	–13378.6*** (1762.8)	–3.534*** (0.113)
Semily	–26310.0*** (430.3)	–3.845*** (0.0426)	–13358.2*** (1760.8)	–3.441*** (0.0939)
Sokolov	–26314.6*** (430.4)	–3.868*** (0.0493)	–13195.5*** (1761.2)	–3.092*** (0.0960)
Strakonice	–26338.3*** (430.5)	–3.903*** (0.0444)	–13342.3*** (1761.7)	–3.373*** (0.1000)
Svitavy	–26153.4*** (430.6)	–3.605*** (0.0460)	–13292.7*** (1761.8)	–3.311*** (0.101)
Tachov	–26456.4*** (431.2)	–4.180*** (0.0686)	–13437.5*** (1762.5)	–3.639*** (0.0964)
Teplice	–25852.3*** (434.0)	–3.274*** (0.0560)	–12770.2*** (1762.3)	–2.586*** (0.102)
Trutnov	–25909.6*** (430.6)	–3.327*** (0.0428)	–13045.2*** (1761.0)	–2.869*** (0.0877)
Tabor	–26021.9*** (430.6)	–3.447*** (0.0455)	–13035.5*** (1761.9)	–2.945*** (0.104)
Trebic	–26031.1*** (430.3)	–3.452*** (0.0418)	–13163.7*** (1763.9)	–3.052*** (0.103)
Uherske Hradiste	–25759.6*** (430.4)	–3.177*** (0.0418)	–12931.7*** (1762.6)	–2.737*** (0.0941)
Vsetin	–25816.0*** (430.9)	–3.227*** (0.0480)	–12958.5*** (1763.2)	–2.769*** (0.0897)
Vyskov	–26166.8*** (430.3)	–3.628*** (0.0411)	–13311.8*** (1761.1)	–3.298*** (0.0903)
Zlin	–25296.6*** (430.7)	–2.831*** (0.0434)	–12638.1*** (1763.9)	–2.453*** (0.0941)
Znojmo	–25997.8*** (430.8)	–3.414*** (0.0412)	–13096.5*** (1762.7)	–2.932*** (0.0919)
Usti nad Labem	–25908.8*** (430.8)	–3.326*** (0.0459)	–13004.8*** (1761.2)	–2.810*** (0.0900)
Usti nad Orlici	–25909.2*** (430.5)	–3.319*** (0.0407)	–13043.8*** (1761.3)	–2.916*** (0.0939)
Ceska Lipa	–26169.8*** (430.4)	–3.635*** (0.0433)	–13174.9*** (1761.5)	–3.053*** (0.0930)
Ceske Budejovice	–25039.1*** (431.7)	–2.684*** (0.0412)	–12553.9*** (1761.9)	–2.351*** (0.0957)
Cesky Krumlov	–26343.1*** (430.6)	–3.915*** (0.0454)	–13372.2*** (1762.9)	–3.417*** (0.0949)
Sumperk	–26045.1*** (430.8)	–3.466*** (0.0429)	–13120.2*** (1761.8)	–2.968*** (0.0932)
Zdar and Sazavou	–25993.8*** (430.7)	–3.407*** (0.0452)	–13243.2*** (1762.9)	–3.179*** (0.101)
Years				
2009		–0.000598 (0.0234)	658.9*** (107.3)	0.795*** (0.0400)
2010	53.35 (40.01)	0.0103 (0.0202)	114.4 (90.45)	0.147*** (0.0277)
2011	16.81 (52.93)	–0.0478* (0.0202)	30.94 (102.2)	0.0476+ (0.0249)
2012	–148.2*** (37.54)	–0.165*** (0.0199)	99.57 (87.43)	0.114*** (0.0223)
2013	–221.8*** (39.02)	–0.232*** (0.0204)	1296.1*** (260.8)	1.003*** (0.0476)
2014	–317.9*** (43.41)	–0.336*** (0.0202)	141.6+ (86.03)	0.174*** (0.0231)
2015	–259.4*** (42.14)	–0.271*** (0.0203)	164.3+ (85.33)	0.180*** (0.0243)
2016	–240.4*** (37.61)	–0.273*** (0.0200)	163.4+ (80.88)	0.189*** (0.0219)
2017	–189.1*** (44.30)	–0.252*** (0.0203)	228.5** (77.58)	0.242*** (0.0214)
2018	–205.2*** (44.06)	–0.269*** (0.0207)	217.7** (80.56)	0.193*** (0.0232)
2019	–201.3*** (45.22)	–0.264*** (0.0203)	706.8*** (119.8)	0.696*** (0.0210)
2020	–281.8*** (37.95)	–0.318*** (0.0206)	149.3+ (84.41)	0.0721** (0.0257)
Other components				
Constant	27040.4*** (435.7)	10.38*** (0.0442)	13502.2*** (1754.0)	9.158*** (0.0850)
Observations	1,001	1,001	1,001	1,001
Prob > chi2	0.000	0.000	0.000	0.000
R²	0.995	0.983	0.819	0.925
Akaike information criterion	13710.6	–1940.8	16249.1	–385.1
Bayesian information criterion	14147.5	–1504.0	16686.0	51.79

Notes: Robust standard errors in parentheses, stat. significance is reported as follows: + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. Reference groups for dummy variables: LAU1 Region – Praha (Capital), Year – 2008.

Source: Own elaboration based on the Czech Statistical Office (2020) data and STATA 14 software..

Table 3. **Forecast quality diagnostics (forecasted observations – 77 per variable)**				
Variable/indicator	Root Mean Squared Error	Mean Absolute Error	Mean Absolute Percent Error	Theil Inequality Coefficient
New Businesses Registrations	180.33	154.52	19.20	0.027
Business Closures	356.74	140.82	21.65	0.097
Source: Own processing based on the EViews 9 software.				

however, we cannot say whether these changes resulted from the pandemic or not. The statistical significance of the included variables and the model R-Squared indicators (R^2) promises the sufficient usage of Models 1 and 3 for forecasting purposes.

Thus, in the next step, we re-estimated Models 1 and 3 based on a reduced sample of the years 2008-2019 (please note we do not report the models for parsimonious reasons again, but they are available upon request) and used the estimates to forecast the values of new registrations and business closures in 2020. The evaluation of the quality of the forecasted values was based on the traditional quality measures like Root Mean Squared Error (RMSE) or Theil Inequality Coefficient [Li et al., 2019]. The forecast quality checks also included comparisons of models with different specifications of trend functions. Still, in the end, we found the specification of models as reported in Table 2 as the most accurate. Table 3 shows forecast accuracy measures for the predicted values.

Finally, we may use these predicted values, simulating a no pandemic situation (or placebo test) and statistically compare them with the actual values of new business registrations and business closures at the end of the year 2020. The results of the paired t-tests are available in Table 4. Unfortunately, they do not find any statistical support for differences between both pairs of variables. Therefore, *we cannot say that the first year of the pandemic significantly influenced the inflows into and outflows from Czech entrepreneurial activity.*

Concluding Remarks

This article aimed to provide empirical evidence concerning the effect of the global pandemic upon the overall population of Czech enterprises after the first year. The conducted analysis is based on administrative data covering business demographics of seventy-seven LAU1 regions over the years 2008-2020. The results from the panel regression models and placebo tests comparing forecasted values of new business registrations and closures with actual values obtained after the end of 2020 do not show that there would be a significant drop in the Czech entrepreneurial activity. Quite the opposite, the data indicate that activity grew and even increased to levels above those observed in 2019.

However, these findings need to be interpreted with caution and do not mean that the pandemic did not influence Czech entrepreneurs. First, entrepreneurs and self-employed persons might have formed expectations that this will only be a short-term event, so they mobilized all available financial reserves to keep the businesses operating with the hope of a better tomorrow. Nevertheless, their capabilities to secure liquidity over a more extended period while experiencing a continuous drop in sales is very limited and might eventually result in bankruptcy [Brown et al., 2020]. Second, the observed increase in the levels of entrepreneurship could be related to the past economic growth of the country, measured in terms of employment, nominal wages, and gross domestic product growth. However, the delay in macroeconomic de-

Table 4. **Results of the paired t-tests comparing actual 2020 values with the forecasted values**				
New Businesses Registrations	mean	standard error	observations (N)	t-statistics
New Businesses Registrations	1,229.47	340.95	77	0.313
New Businesses Registrations (Forecasted)	1,381.55	345.90	77	**p-value (H₁: Difference≠0)** 0.755
Business Closures	mean	standard error	observations (N)	t-statistics
Business Closures	800.01	208.97	77	0.247
Business Closures (Forecasted)	732.84	173.60	77	**p-value (H₁: Difference≠0):** 0.805
Source: Own processing based on the EViews 9 software.				

velopment is expected to shift this positive trend as the pandemic is ongoing and restrictions are still active [*Jašová et al.,* 2017; *Petkovski et al.,* 2018; *Hedvičáková, Kozubíková,* 2021]. Third, along with government restrictions, several public policy actions aimed at mitigating the adverse effects of the pandemic upon Czech businesses were introduced. The main programs were focused on maintaining employment and jobs through subsidies, investment, innovation research, and development projects funded through grants, tax relief schemes, and the coverage of selected operational costs such as rental costs. Besides, entrepreneurship and SME policy expanded the offer of credit guarantees and soft loans provided by the Czech-Moravian Guarantee and Development Bank. In addition, several specific programs were aimed at supporting the most endangered sectors such as tourism, hospitality, culture or sport. These policy efforts might delay business bankruptcies and help entrepreneurs and self-employed persons to survive these difficult times [*Betzler et al.,* 2021; *Hedvičáková, Kozubíková,* 2021; *Novotný, Pellešová,* 2021]. However, it is challenging to say whether these policies will get to those most in need as the effects of Czech entrepreneurship and SME policies were not always found to be positive, as documented in evaluation studies by [*Assudani et al.,* 2017; Čadil *et al.,* 2017; *Pelucha et al.,* 2019; *Ratinger et al.,* 2020; *Dvouletý et al.,* 2021a] indicating that the programs are often used by "professional aid applicants" and those who need public support do not even apply. It will be thus critical to assess these programs carefully, see the structure of the applicants and analyze their effects by using rigorous counterfactual impact evaluation research designs. Fourth, business demography statistics capture only formal registrations and formal closures. The real picture may differ due to the fact that some do not quit officially while already exhibiting no entrepreneurial activity; on the contrary, many start-ups make their first steps while not yet officially registered [*Stenholm et al.,* 2013; *Dvouletý,* 2018]. Therefore, the

official statistics cannot capture individuals who intended to start a business, but due to the pandemic never proceeded with official registration or with the later stages of the business preparations [*Nakara et al.,* 2020; *Loan et al.,* 2021; *Dvouletý et al.,* 2021a]. It is expected that especially this group of individuals will be negatively influenced by the pandemic, which mitigated mobility, social activities, and gathering, which are often considered supportive for the development of the business to more advanced stages [*Kibler et al.,* 2014]. Still, the lack of data on entrepreneurial intentions needs to be understood as a limitation of the presented empirical results. Another limitation of the conducted study is the lack of the data on factors influencing the development of the entrepreneurial activity at the LAU1 level, which could be used as predictors making the forecasted values more precise. These could include regional determinants of entrepreneurship identified by the previous literature such as the level of regional gross domestic product (GDP), unemployment, educational structure of the population, supportive institutions (incubators, accelerators, research centers, or science parks), transportation infrastructure, or labor structure of inhabitants [*Fritsch, Falck,* 2007; *Dvouletý,* 2017; *Neumann,* 2020; *Demirdag, Eraydin,* 2021].

Many future research challenges are arising based on this study. For example, what will the long-term effects of this pandemic be and how will it reshape entrepreneurial activity? What changes will there be in entrepreneurial activity concerning sectoral classification? Will industries more harmed by restrictions report higher bankruptcy rates when compared with the sectors that could more easily move their businesses online? How has the pandemic affected the entrepreneur's personality, family relations, and his/her overall well-being? Unfortunately, to answer all these intriguing questions, we need to wait for more data and for a time when the pandemic is truly over. Nevertheless, researchers may already start collecting data for answering these questions in the future.

References

Apostolopoulos N., Liargovas P., Sklias P., Apostolopoulos S. (2021) Healthcare enterprises and public policies on COVID-19: Insights from the Greek rural areas. *Strategic Change*, 30(2), 127–136. https://doi.org/10.1002/jsc.2396

Assudani R., Mroczkowski T., Muñoz-Fernández A., Khilji S.E. (2017) Entrepreneurial support systems: Role of the Czech accelerator. *International Journal of Entrepreneurship and Innovation Management*, 21(6), 530–552. DOI:10.1504/IJEIM.2017.10007125

Audretsch D.B., Falck O., Feldman M.P., Heblich S. (2012) Local entrepreneurship in context. *Regional Studies*, 46(3), 379–389. https://doi.org/10.1080/00343404.2010.490209

Baštová M., Hubáčková V., Frantál B. (2011) Interregional differences in the Czech Republic, 2000–2008. *Moravian Geographical Reports*, 19(1), 2–16.

Betzler D., Loots E., Prokůpek M., Marques L., Grafenauer P. (2020) COVID-19 and the arts and cultural sectors: Investigating countries' contextual factors and early policy measures. *International Journal of Cultural Policy* (forthcoming). https://doi.org/10.1080/10286632.2020.1842383

Brown R., Rocha A., Cowling M. (2020) Financing entrepreneurship in times of crisis: Exploring the impact of COVID-19 on the market for entrepreneurial finance in the United Kingdom. *International Small Business Journal*, 38(5), 380–390. https://doi.org/10.1177%2F0266242620937464

Čadil J., Mirošník K., Rehák J. (2017) The lack of short-term impact of cohesion policy on the competitiveness of SMEs. *International Small Business Journal*, 35(8), 991–1009. https://doi.org/10.1177%2F0266242617695382

Congregado E. (ed.) (2007) *Measuring Entrepreneurship: Building a Statistical System*, Heidelberg, Dordrecht, London, New York: Springer.

Croteau M., Grant K.A., Rojas C., Abdelhamid H. (2021) The lost generation of entrepreneurs? The impact of COVID-19 on the availability of risk capital in Canada. *Journal of Entrepreneurship in Emerging Economies* (forthcoming). https://doi.org/10.1108/JEEE-07-2020-0273

Demirdag İ., Eraydin A. (2021) Explaining regional differences in firm formation rates: How far are government policies important for entrepreneurship? *Journal of Entrepreneurship in Emerging Economies*, 13(2), 254–281. https://doi.org/10.1108/JEEE-02-2020-0040

Doern R., Williams N., Vorley T. (2019) Special issue on entrepreneurship and crises: Business as usual? An introduction and review of the literature. *Entrepreneurship and Regional Development*, 31(5–6), 400–412. https://doi.org/10.1080/08985626.2018.1541590

Dvorak J., Komarkova L., Stehlik L. (2021) The effect of the COVID-19 crisis on the perception of digitization in the purchasing process: Customers and retailers perspective. *Journal of Entrepreneurship in Emerging Economies* (forthcoming). https://doi.org/10.1108/JEEE-07-2020-0260

Dvouletý O. (2017) Can Policy Makers Count with Positive Impact of Entrepreneurship on Economic Development of the Czech Regions? *Journal of Entrepreneurship in Emerging Economies*, 9(3), 286–299. https://doi.org/10.1108/JEEE-11-2016-0052

Dvouletý O. (2018) How to analyse determinants of entrepreneurship and self-employment at the country level? A methodological contribution. *Journal of Business Venturing Insights*, 9, 92–99. https://doi.org/10.1016/j.jbvi.2018.03.002

Dvouletý O. (2019) Development of entrepreneurial activity in the Czech Republic over the years 2005–2017. *Journal of Open Innovation: Technology, Market, and Complexity*, 5(3), 38. https://doi.org/10.3390/joitmc5030038

Dvouletý O., Blažková I., Potluka O. (2021a) Estimating the Effects of Public Subsidies on the Performance of Supported Enterprises across Firm Sizes. *Research Evaluation* (forthcoming). https://doi.org/10.1093/reseval/rvab004

Dvouletý O., Fernandez de Arroyabe J.C., Mustafa M. (2021b) Guest Editorial: Entrepreneurship during the times of COVID-19 pandemic: Challenges and consequences. *Journal of Entrepreneurship in Emerging Economies*, 13(4), 489–496.

Freytag A., Thurik R. (2007) Entrepreneurship and its determinants in a cross-country setting. *Journal of Evolutionary Economics*, 17(2), 117–131. https://doi.org/10.1007/s00191-006-0044-2

Fritsch M., Falck O. (2007) New business formation by industry over space and time: A multidimensional analysis. *Regional Studies*, 41(2), 157–172. https://doi.org/10.1080/00343400600928301

Hamplová E., Bal-Domańska B., Provazníková K. (2021) Business activity and its Concentration in the Czech Republic and Poland in the years 2018–2020. In: *Hradec Economic Days* (eds. J. Maci, P. Maresova, K. Firlej, I. Soukal), Hradec Králové: University of Hradec Králové, pp. 217–224.

Hedvičáková M., Kozubíková Z. (2021) Impacts of COVID-19 on the Labour Market — Evidence from the Czech Republic. In: *Hradec Economic Days* (eds. J. Maci, P. Maresova, K. Firlej, I. Soukal), Hradec Králové: University of Hradec Králové, pp. 232–241.

Iversen J., Jørgensen R., Malchow-Møller N. (2007) Defining and measuring entrepreneurship. *Foundations and Trends® in Entrepreneurship*, 4(1), 1–63. http://dx.doi.org/10.1561/0300000020

Jašová E., Kadeřábková B., Čermáková K. (2017) Use of the method of the stochastic trend for NAIRU estimation in the Czech Republic and Slovakia at the macro-and meso-levels. *Economic Research – Ekonomska Istraživanja*, 30(1), 256–272. https://doi.org/10.1080/1331677X.2017.1305782

Kibler E., Kautonen T., Fink M. (2014) Regional Social Legitimacy of Entrepreneurship: Implications for Entrepreneurial Intention and Start-up Behaviour. *Regional Studies,* 48(6), 995–1015. https://doi.org/10.1080/00343404.2013.851373

Kuckertz A., Brändle L., Gaudig A., Hinderer S., Morales A., Prochotta A., Steinbrink K., Berger E.S. (2020) Startups in Times of Crisis – A Rapid Response to the COVID-19 Pandemic. *Journal of Business Venturing Insights,* 13, e00169. https://doi.org/10.1016/j.jbvi.2020.e00169

Li R., Dong Y., Zhu Z., Li C., Yang H. (2019) A dynamic evaluation framework for ambient air pollution monitoring. *Applied Mathematical Modelling*, 65, 52–71. https://doi.org/10.1016/j.apm.2018.07.052

Loan L.T., Doanh D.C., Thang H.N., Viet Nga N.T., Van P.T., Hoa P.T. (2021) Entrepreneurial behaviour: The effects of fear and anxiety of COVID-19 and business opportunity recognition. *Entrepreneurial Business and Economics Review*, 9(3), 7–23. DOI:10.15678/EBER.2021.090301

Muñoz P., Kimmitt J. (2019) Rural entrepreneurship in place: An integrated framework. *Entrepreneurship and Regional Development*, 31(9–10), 842–873. https://doi.org/10.1080/08985626.2019.1609593

Nakara W.A., Laouiti R., Chavez R., Gharbi S. (2020) An economic view of entrepreneurial intention. *International Journal of Entrepreneurial Behavior & Research*, 26(8), 1807–1826. https://doi.org/10.1108/IJEBR-12-2019-0693

Neumann T. (2020) The impact of entrepreneurship on economic, social and environmental welfare and its determinants: A systematic review. *Management Review Quarterly*, 71, 553–584. https://doi.org/10.1007/s11301-020-00193-7

Novotný L., Pellešová P. (2021) Impact of the COVID-19 Crisis on the Regulation to Tourism in the Czech Republic. *Central European Public Administration Review*, 19(1), 199–222. DOI:10.17573/cepar.2021.1.09

Pedauga L., Sáez F., Delgado-Márquez B.L. (2021) Macroeconomic lockdown and SMEs: The impact of the COVID-19 pandemic in Spain. *Small Business Economics* (forthcoming). https://doi.org/10.1007/s11187-021-00476-7

Pelucha M., Kveton V., Potluka O. (2019) Using mixed method approach in measuring effects of training in firms: Case study of the European Social Fund support. *Evaluation and Program Planning*, 73, 146–155. https://doi.org/10.1016/j.evalprogplan.2018.12.008

Petkovski M., Kjosevski J., Jovanovski K. (2018) Empirical Panel Analysis of Non-Performing Loans in the Czech Republic. What are their Determinants and How Strong is Their Impact on the Real Economy? *Finance a Uver*, 68(5), 460–490.

Rashid S., Ratten V. (2021) Entrepreneurial ecosystems during COVID-19: The survival of small businesses using dynamic capabilities. *World Journal of Entrepreneurship, Management and Sustainable Development* (forthcoming). https://doi.org/10.1108/WJEMSD-09-2020-0110

Ratinger T., Čadil V., Agyemang S.A. (2020) Are there any economic impacts of business R&D support? The case of the Czech Republic. *Central European Business Review*, 9(5), 45–62. DOI:10.18267/j.cebr.251

Ratten V. (2020) Coronavirus (COVID-19) and entrepreneurship: Changing life and work landscape. *Journal of Small Business and Entrepreneurship*, 32(5), 503–516. https://doi.org/10.1080/08276331.2020.1790167

Santos S.C., Caetano A., Spagnoli P., Costa S.F., Neumeyer X. (2017) Predictors of entrepreneurial activity before and during the European economic crisis. *International Entrepreneurship and Management Journal*, 13(4), 1263–1288. https://doi.org/10.1007/s11365-017-0453-8

Stenholm P., Acs Z.J., Wuebker R. (2013) Exploring country-level institutional arrangements on the rate and type of entrepreneurial activity. *Journal of Business Venturing*, 28(1), 176–193. https://doi.org/10.1016/j.jbusvent.2011.11.002

Storr V.H., Haeffele S., Lofthouse J.K., Grube L.E. (2021) Essential or not? Knowledge problems and COVID-19 stay-at-home orders. *Southern Economic Journal*, 87(4), 1229–1249. https://doi.org/10.1002/soej.12491

Urbano D., Aparicio S., Audretsch D. (2019) Twenty-five years of research on institutions, entrepreneurship, and economic growth: What has been learned? *Small Business Economics*, 53(1), 21–49. https://doi.org/10.1007/s11187-018-0038-0

Verbeek M. (2008) *A guide to modern econometrics*, Chichester: John Wiley & Sons.

Żak M., Garncarz J. (2020) Economic policy towards the challenges of the COVID-19 pandemic in selected European Union countries. *International Entrepreneurship Review*, 6(4), 21–34. https://doi.org/10.15678/IER.2020.0604.02