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# No escape from COVID-19 consequences: cross-sectoral evaluation of impact on unemployment in Slovakia

**ABSTRACT:** *The coronavirus disease 2019 (COVID-19) pandemic, which hit the world in 2020 and is still persisting, has significantly impacted many areas of people's lives. The shutdown anti-pandemic measures implemented by the governments also caused the development of unemployment worldwide. In Slovakia, the restrictions or even complete closure of the operation and activities of the companies caused rising unemployment in some sectors, while in some sectors, the impact was not so substantial. Therefore, the main aim of this study was to analyse and quantify the impact of COVID-19 pandemic on unemployment in various sectors of economic activities in Slovakia. For impact evaluation, a counterfactual approach was used, with analysis of time series development and statistically created counterfactual situation. The analysis was based on real data about the unemployment situation in Slovakia in the period January 2013–April 2021. The results of the study showed that the most affected sectors according to the NACE classification were F – construction, I – accommodation and food service activities and R – arts, entertainment and recreation, showing an increase in unemployment of 89%, 88%, and 65%, respectively. The analysis in this study showed that the impact of a pandemic should be quantified among the sectors, as there are large differences in unemployment caused by the pandemic. From these findings, it is necessary to deduce the different intensities and amount of state aid to companies or employees in these sectors. The results of the study should help to target the policy interventions better to mitigate the impact of the pandemic.*

**KEYWORDS:** COVID-19 pandemic, impact evaluation, jobseekers, unemployment

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## INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has caused the worst economic recession since World War II, causing enormous damage to people's health, jobs and well-being. The coronavirus pandemic has become an unpredictable global risk, the uncertainty of which is currently paralysing society as a whole, parallel to the national economies of the world's states (Frnda & Durica, 2021). We are talking about the so-called global health crisis affecting an economy in recession. According to the Organisation for Economic Co-operation and Development (OECD) forecasts, the pandemic could lead to lasting changes in demand and structural shifts in the economy (Ababulgu Abasimel & Wana Fufa, 2021; Achdut & Refaeli, 2020). Real per capita income was expected to fall to the level of 2015, which means a loss of 5 years of income growth. The unemployment rate was estimated to reach almost 10%. About 100,000 people could lose their jobs, and most of them are from vulnerable groups (Autin et al., 2020; Binder, 2020; Hensher, 2020).

The performance of economy can be measured by the country's gross domestic product (GDP). According to current data from the Statistical Office of the Slovak Republic, the development of GDP in the third quarter of 2021 recorded a year-on-year increase of 1.3% to 23.08 billion EUR at constant prices. Compared to the third quarter of 2020, the increase was approximately 300 million EUR; but compared to the same quarter in 2019, the economy lacked about 170 million EUR. The National Bank of Slovakia stated in its predictions that economic growth in 2022 should be at the level of 5.8% and GDP should grow by 3.1%. Inflation is expected to be around 7% in 2022, mainly due to externalities caused by the emergence of new coronavirus variants, changes in energy prices

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or wage expectations, which lead to a precarious situation that would cause rapid price increases. The structure of the economy within the Slovak Republic is divided into sectors according to the Statistical classification of economic activities in the European Community (Nomenclature statistique des activités économiques dans la Communauté européenne – NACE) (Svabova et al., 2020). These are sectors such as agriculture, forestry, fishing, industrial production, construction, wholesale, retail, motor vehicle repair, transport and storage, information and communication, financial and insurance activities, real estate activities, professional, scientific and technical activities, administrative services, public administration, defence, compulsory social security, education, healthcare, arts, entertainment or recreation. The industrial component is the most important component in the GDP of the Slovak economy. The growth potential of Slovakia depends primarily on industrial production, which, within its development, also creates conditions for the growth of high-tech services, especially in the area of significant growth in the share of IT use in complex business management. Last but not least, it is also a source of trade development as well as construction, provided that investment in the industry grows. The specifics of the Slovak economy include a huge focus on the automotive industry. Too much focus on this manufacturing sector poses the risks that have emerged since the onset of the COVID-19 crisis. It is necessary to reconsider transformation of the automotive sector in Slovakia, to realise a larger inflow of money into research and development not only in the automotive industry, but also in the engineering and electrical engineering industries. On the other hand, we have sectors that are considerably undersized. These sectors are, for example, tourism and services.

In Slovakia, these high-risk groups include non-standard workers, especially the self-employed and temporary workers, the marginalised Roma community and young people. The performance of the Slovak economy is negatively affected by the situation associated with COVID-19 and government measures to mitigate its effects on the Slovak population (Danielova & Lauko, 2014; Dvorak et al., 2020). Since last year, Slovakia has been ranked among the countries with severely affected economy and employment. Many employers have been under pressure to reduce costs by reducing business activity and also consumer demand through redundancies. As a result, according to data obtained from the Statistical Office of the Slovak Republic, the number of unemployed people during 2020 developed upwards. It peaked in the third quarter of 2020, when, according to the Labour Force Survey data, up to 196.5 thousand people were unemployed, representing an unemployment rate of 7.2%. The most significant number of unemployed people were from industry, up to 45.6 thousand, followed by a group of inhabitants who had not yet started any employment (37.7 thousand). Within wholesale and retail trade, construction, public administration and the accommodation sectors, the number of unemployed was more than 10,000. In 2020, the unemployment rate in the Slovak Republic had been on the rise since March, when the first wave of COVID-19 tightened restrictions and closed operations. With subsequent easing of the restrictions, the level of unemployment also decreased. Still, with further introduction of measures and tightening up by the government and a council of experts as the situation worsened, it increased again. The unemployment rate from January to March 2021, as recorded by the Central Office of Labour, Social Affairs and Family (COLSAF), showed an increasing tendency (Statistical office of the Slovak Republic, 2021).

However, when analysing unemployment in individual sectors, we must consider not only the number of unemployed during 2020 and early 2021 that were hit by the waves of the pandemic, but also the relative increase in percentage. Moreover, unemployment is naturally higher in some sectors than in others, and the seasonality of unemployment in some sectors or occupations must also be considered. Therefore, this study aims to evaluate the impact of the pandemic on unemployment in individual sectors in Slovakia. We performed the analysis with a counterfactual approach to impact evaluation based on time series analysis and modelling. According to our knowledge, this approach has not been used to impact assessment of the pandemic in Slovakia. So, we consider this study to be innovative in this respect. A rigorous impact evaluation based on a counterfactual approach is the main strength of this study. The main contribution is identification of the most affected sectors and quantifying the amount of the impact on the unemployment rate in them. More precisely, we can say that identification of the most affected sectors was already known in Slovakia, but the benefit of this study is the accurate quantification of the impact on the inflow of new jobseekers in these sectors and cross-sectoral comparison with specific quantitative results. The main research question in this study is how strong the impact of the COVID-19 pandemic is on the increase in unemployment in the most affected sectors (and their identification), assuming a significant impact in the most affected sectors of up to 60%–80% compared to the expected unemployment rate. The results of this study can be used in practice to set up the conditions of the active labour market policy interventions aimed at mitigating the effects of a pandemic, where targeting measures to the most affected sectors brings the necessary effect and, moreover, is in line with the European Union's (EU's) requirements for implementing evidence-based policies and intervention measures. In addition, quantification of impacts can serve as a basis for allocating funds to implement such measures.

The rest of the paper is organised as follows. First, the literature review section highlights the recent studies focusing on the issue of unemployment. Then, the methodology and data section describes the data used in this study and the methodology of the analysis. The next section states the analysis results, where the most affected sectors are identified and the impacts of the COVID-19 pandemic on unemployment in Slovakia are quantified. In discussion, the main weaknesses of the study and its possible future directions are described. Moreover, several implications for the public policies are outlined. The last section summarises the results of the study and concludes.

## LITERATURE OVERVIEW

During the year 2020, many authors addressed the issue of performance and productivity of sectors across the world economies of countries around the world, in association with the situation and developments in the labour market (Al-Youbi et al., 2020; Becka, 2020; Dias et al., 2020; Groshen, 2020; Lee et al., 2020; Mayhew & Anand, 2020; Sahin et al., 2020; Suomi et al., 2020). Cerqua et al. (2020), for example, assess the impact of voluntary training for the unemployed on employment using the English administrative data set. Shapoval et al. (2021), in their study, focus on the effects of the COVID-19 crisis on restaurants from the perspective of a selected group of hospitality leaders in the USA, Israel and Sweden. The views and opinions of these authors focused on managing the COVID-19 crisis through the lens of social systems theory and Hofstede's (1980) cultural dimensions. Kaczmarek et al. (2021) found in their study that firms with a low valuation, limited leverage and high investment were more resilient to the collapse caused by the pandemic. Carrillo-Tudela et al. (2021) examine the recent decline in unemployment and the increase in part-time work and labour market participation among the best-aged Germans. Unemployment has fallen as Hartz's reforms have caused a large proportion of the long-term unemployed to drop off as jobseekers. However, participation in the workforce has increased as many women have accepted low-paid part-time work. In their study, Bauer and Weber (2020), based on the counterfactual simulations, show that the observed changes in registered and unregistered unemployment after 2002 essentially resulted from changes in their outflow. In summary, short-term anti-pandemic closure measures have increased unemployment by 117,000 people.

The study of Sheldon (2020) found that the impact of the measures that came into force on 16 March 2020 following the COVID-19 pandemic appears dramatic in the Swiss labour market. In March and April, an average of around 30,000 employees lost their jobs after leaving the service. During these 2 months, the unemployment rate had risen almost as much as throughout 2010 after the financial crisis. According to this, the State Secretariat for Economic Affairs currently expects the unemployment rate to be average 4.1% next year, eventually reaching 7% if the shutdown persists, even though more than a quarter of employees are currently working short hours to prevent unemployment. Forsythe and Wu (2021) found that the increase in the unemployment rate during the recession for young, non-white and less-educated groups of workers is primarily due to lower job search rates, which may explain more than 60% of cyclical fluctuations in unemployment across Europe.

COVID-19 and subsequent changes in mobility have changed employment relationships for millions of people worldwide. New evidence suggests that women may be more severely affected by this change. However, a pandemic may impact the immediate restructuring of employment and the shift of gender roles in households due to changes in labour division in the household. In Reichelt et al.'s (2021) study, the authors analysed a representative sample of respondents in the USA, Germany and Singapore and found that transitions to unemployment, part-time work and transitions from home were more common among women than men, although not to the same extent in the three countries. Hensvik et al. (2021) measure job search responses to the COVID-19 pandemic using job vacancy data and real-time job postings on Sweden's largest online job bulletin board. The authors found that new job vacancies have fallen by 40%, similar to the USA.

Moreover, the jobseekers responded by less intensively seeking jobs, to the extent that effective labour market tensions increased during the first 3 months after the outbreak of COVID. Instead, they redirected their search to the less-disabled occupations. Overall, these job search responses have the potential to exacerbate labour demand shocks. In their study, Bhattacharjee and Lisauskaite (2020) showed that the impacts of COVID-19 on different regions and sectors in the UK vary greatly, accounting for the differences between different types of households.

Several studies have been conducted in Slovakia dealing with the issue of the impact of the COVID-19 pandemic, although there are not many of them so far. Svabova et al. (2020) assessed the impact of the COVID-19 pandemic on unemployment. In this study, the authors compared the inflow and outflow of jobseekers in different sectors of economic activity in Slovakia, identifying the

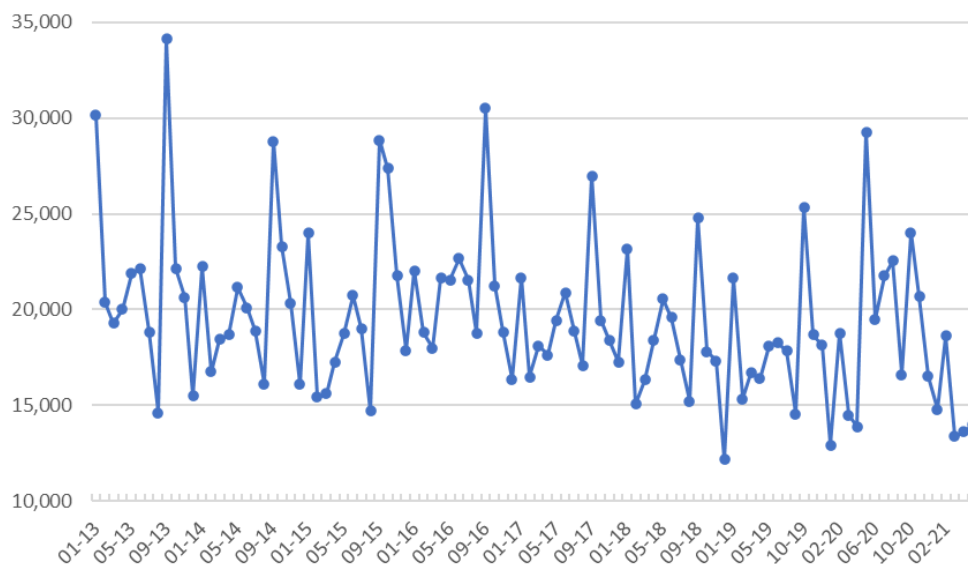
sectors with the highest numbers of new jobseekers in 2020 and those with the highest relative increase in new jobseekers compared to the previous year. The sectors most affected in terms of the comparison thus established proved to be accommodation and food service activities, real estate activities, administrative and support service activities, arts, entertainment and recreation sector and other services industry. In another study, Svabova et al. (2021) evaluated the impact of the pandemic on four different unemployment indicators in Slovakia. Using a counterfactual approach, the authors quantified the impact on the inflow of new jobseekers, the total number of all jobseekers and the unemployment rate in Slovakia. Olah et al. (2021) compared the impact of the pandemic on youth unemployment in Slovakia and other EU countries, identifying the countries where there was a most significant increase in the number of youth jobseekers and their unemployment rates during 2020. In Chubarova et al.'s (2020) study, the authors compared public policy response to pandemics in Slovakia, the Czech Republic and Russia. The authors compared the speed, extent and sequence of government interventions in these countries and evaluated their effectiveness in preventing the spread of the virus. In his study, Michalek (2021) dealt with the unemployment of the population during the COVID-19 pandemic in Slovakia in 2020. Labour force survey data reveal a contrast between large job losses in the most affected sectors, such as accommodation and catering services, arts and culture, activities of restaurants and inns, retail and construction, and positive job growth in some skilled service sectors, for example, information and communications, postal and courier services, and financial and insurance services and activities. Authors such as Lambovska et al. (2021) examined the impact of COVID-19 on youth unemployment in European countries. In their contribution, Hlawiczka and Kollar (2021) compared the unemployment rate of EU countries, including the Slovak Republic. Frank et al. (2021) focused on the economic development of the Slovak Republic and the development of employment in 2020.

## METHODOLOGY AND DATA

The article focuses on analysing and quantifying the impacts of the COVID-19 pandemic on unemployment in various sectors of economic activity in Slovakia. Sectors are identified using NACE codes, while the analysis included sectors marked A–S. The last two sectors (T and U) have a very low representation in Slovakia. Only a few registered jobseekers are categorised into these two sectors (mostly zero per month, maximum unit numbers). We used publicly available data on unemployment, published by COLSAF of the Slovak Republic (COLSAF SR) every month in the same structure since the beginning of 2013. Therefore, the period included in this analysis was from January 2013 to April 2021 (last published data), that is, 100 consecutive months. The variable used in the analysis was the monthly number of newly registered jobseekers (*inflow* of jobseekers). We have compiled a database for this study based on the aggregation of individual monthly data on jobseekers in Slovakia. COLSAF SR publishes the numbers of unemployed in summary and according to the sector of economic activity of the last employer before registering the given individual in the database of jobseekers. In addition to individual sectors, a group of those who did not have a job immediately before registration in the jobseekers' database (e.g. school graduates) is also registered. In this analysis, we will focus on individual sectors and the monthly inflow of newly unemployed people in them. Figure 1 shows the development of the total monthly inflow of new jobseekers in Slovakia during the period included in this analysis.

Of course, the pandemic has had a different impact on unemployment in individual sectors. To obtain the most accurate results of quantifying the impact of a pandemic on the inflow of new jobseekers, we proceeded as follows. We divided the time series of 100 monthly data into two parts: the first 86 months covered January 2013–March 2020 and formed the non-pandemic period. The development of the inflow of the unemployed in this period is a reference development for us, which we model using a time series. Due to the seasonality of the inflow of newly unemployed in almost all sectors of economic activity, we also included the months of the year in the time series model in the form of 12 dummy variables, which represent the seasonal nature of the time series. Seasonality is especially evident for some sectors such as construction or education. To reveal the significance of each season, we created a regression model for each sector using the stepwise method. Subsequently, we used the created models of inflow of new jobseekers for individual industries according to NACE to predict further development during April 2020–April 2021 (pandemic period in Slovakia). We then compared this prediction with the real values of the newly unemployed people, which were recorded during the given pandemic period. We then quantified the impact of the pandemic as the difference in the expected value based on the model and the actual value of the average monthly number of newly unemployed in the sector (Cerulli, 2015). This approach can be considered as the application of the counterfactual method of before–after comparison, which is one of the most commonly used methods in the field of impact evaluations (Frondele & Schmidt, 2005; Pelucha et al., 2019; Potluka et al., 2016). In counterfactual evaluations, we quantify the impact of an

Fig. 1: Inflow of newly registered jobseekers in total. Source: own elaboration



intervention on the group of intervened units (individuals) while creating a control (comparison) group of individuals who were not exposed to this intervention (Arco-Tirado et al., 2018; Caliendo & Schmidl, 2016; Cerulli, 2015). The impact is then the difference in the expected values of the result variable of these two groups. At the same time, for the intervention group, we can measure the values of the result variable after the intervention, and for the control group, its values without the intervention (Angrist & Pischke, 2009; Blazkova & Dvoulety, 2019; Cerulli, 2015). Due to data availability, the intervention group itself in the pre-intervention period is often used as a control group. This before–after comparison estimates the impact of the intervention on the participants’ results. In the impact assessment of the pandemic, the result variable is the inflow of new jobseekers and the intervention is the arrival of a pandemic to Slovakia, or more precisely, the introduction of anti-pandemic measures.

For completeness, in Table 1, we present an overview of the anti-pandemic measures introduced by the Government of the Slovak Republic during 2020.

## EMPIRICAL RESULTS AND DISCUSSION

We analysed all sectors from A to S according to NACE categorisation. Table 2 shows the results for all sectors, and we will look in more detail at those where the impact of the pandemic was estimated to be highest.

The *Real average* column shows the average monthly inflows of new jobseekers in individual sectors, published by COLSAF SR. In the *Predicted average* column, the average values of the monthly inflow of new jobseekers during the pandemic period are estimated using the created regression models for each sector. Variable *Impact* quantifies the impact of a pandemic by comparing the estimated mean and the actual average as an increase in the average inflow of individuals who entered into the database of jobseekers compared to the estimated values. In addition, we present the impact in relative terms, where the *Average impact monthly* column shows the predicted average of the monthly differences and the real number of new jobseekers in per cent (as a percentage of the predicted number of new jobseekers). *Impact in per cent* is the percentage of the absolute impact from the predicted average of new jobseekers.

The highest absolute increases in the number of newly unemployed persons were in the sectors I – accommodation and food service activities (on average, 373 more people entered unemployment per month than estimated by the model), C – manufacturing (on average, 306 persons per month more), F – construction (on average, 241 more unemployed monthly), N – administrative and support service activities (on average, 91 more unemployed monthly) and H – transportation and storage (on average, 91 more unemployed monthly). However, these are absolute numbers that may not be sufficiently meaningful, as in some sectors, the monthly

**Tab. 1:** Timeline of anti-pandemic measures in Slovakia. Source: own elaboration according to Wikipedia (2021)

Start date of the measure	Introduced measure
6 March 2020	The first confirmed case of COVID-19 in the SR
10 March 2020	Prohibition of organising events, mandatory quarantine for all those who have returned from the most affected countries
12 March 2020	Closing schools and leisure facilities, stopping international transport and introducing mandatory quarantine when returning from abroad
15 March 2020	Declaration of a state of emergency
16 March 2020	Closure of all schools and leisure facilities, compulsory state quarantine, prohibited retail sales and services
25 March 2020	Compulsory wearing of masks
22 April 2020	The first phase of loosening restrictions
6 May 2020	The second and third phases of loosening restrictions
20 May 2020	The fourth phase of loosening restrictions
3 June 2020	The fifth phase of loosening restrictions
14 June 2020	End of the state of emergency in the SR
22 June 2020	Opening of schools on a voluntary basis
11 August 2020	The second wave of pandemic in SR
3 September 2020	Introduction of district pandemic 'traffic lights'
1 October 2020	Declaration of a state of emergency in the SR, new anti-pandemic measures
12 October 2020	Interruption of classroom learning in high schools
15 October 2020	New measures about wearing masks, mass events and restrictions on the operation of restaurants
23 October 2020	Pilot mass testing in selected districts of Slovakia
31 October–1 November 2020	The first round of mass testing
7 November–8 November 2020	The second round of mass testing
24 October 2020	Lockdown, curfew
26 October 2020	Closing of all schools
9 November 2020	Changes in the exceptions from lockdown
16 November 2020	Loosening of restrictions
16 December 2020	Introduction of COVID automat
19 December 2020	Lockdown
21 December 2020	Compulsory quarantine for travellers from Great Britain
1 January 2021	Stricter measures, curfew and ban on visits, regulation of work from home
3 March 2021	Night curfew, restrictions on movement outside the district of permanent residence
15 March 2020	Mandatory wearing respirators indoors
25 March 2020	Tightening the night curfew and movement outside the district of permanent residence

COVID, coronavirus disease; SR, Slovak Republic

inflows of new jobseekers tend to be high even under normal circumstances (e.g. the mentioned sector C – manufacturing). In others, there are, on the contrary, ordinarily low numbers of new jobseekers (e.g. D – electricity, gas, steam and air conditioning supply or B – mining and quarrying). This is why, in addition to the absolute impact, we also calculated a relative percentage increase in the number of new jobseekers compared to the predicted numbers. In this respect, the impact of the pandemic was strongest on the following sectors: F – construction (average monthly difference in the number of new jobseekers compared to the prediction is 141%, percentage impact almost 89% of the predicted number), I – accommodation and food service activities (average monthly difference 86%, percentage impact 88%), R – arts, entertainment and recreation (average monthly difference 64%, percentage impact 65%), D – electricity, gas, steam and air conditioning supply (average difference almost 62% and impact almost 46%, but in this sector, the number of jobseekers is ordinarily low) and L – real estate activities (average monthly difference 41%, percentage impact 41%). More precise numbers, as well as values for other sectors, are given in Table 1.

Tab. 2: Quantification of the impact of the pandemic on unemployment in NACE sectors. Source: own elaboration

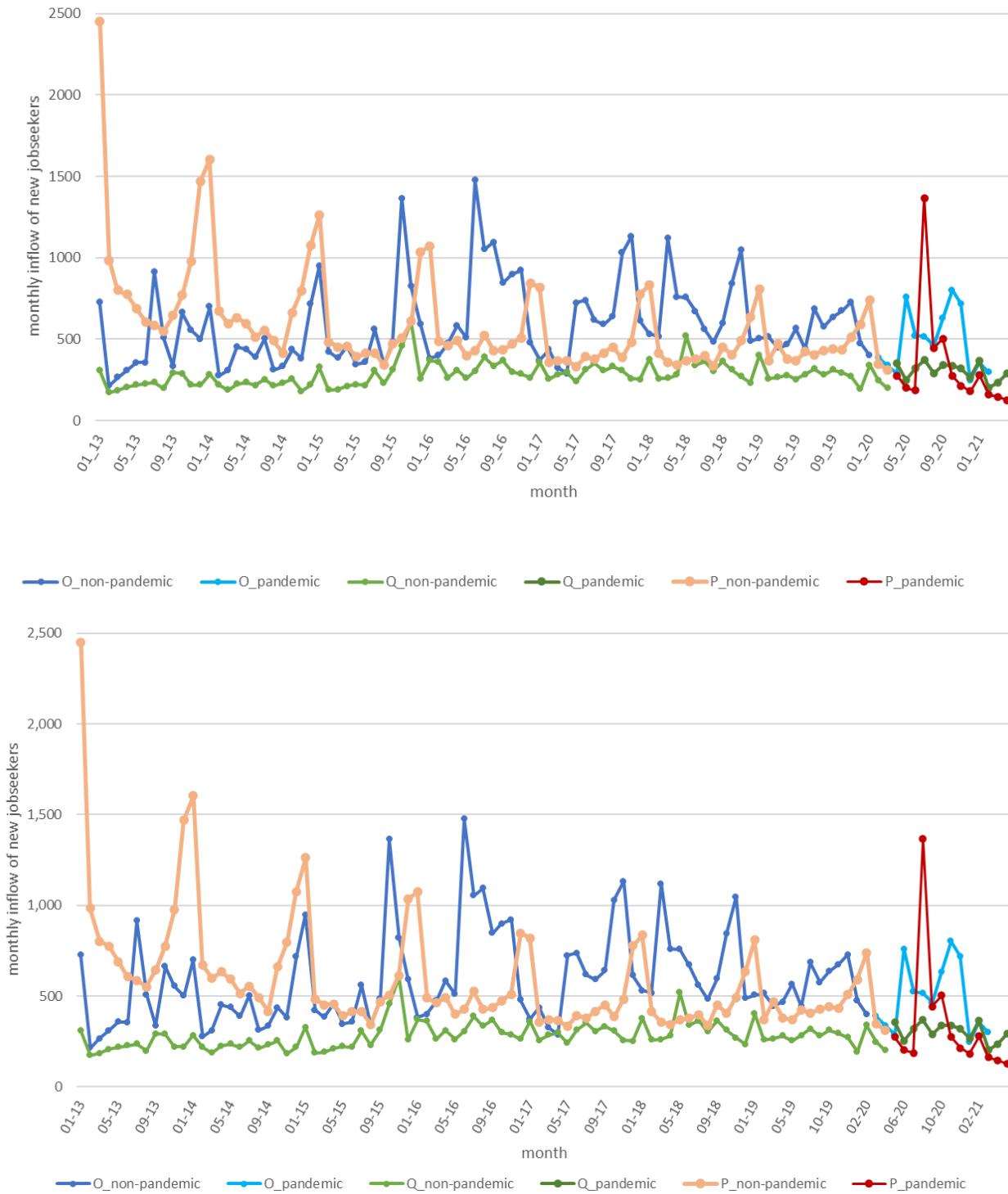
Code	Economic Area	Real average	Predicted average	Impact	Average impact monthly (%)	Impact (%)
A	agriculture, forestry and fishing	213,69	186,29	27,40	31,80	14,71
B	mining and quarrying	17,54	16,46	1,08	5,63	6,54
C	manufacturing	214,692	184,069	306,23	16,08	16,64
D	electricity, gas, steam and air conditioning supply	28,46	19,51	8,95	61,75	45,87
E	water supply; sewerage, waste management and remediation activities	68,23	63,73	4,50	9,63	7,07
F	construction	512,00	271,13	240,87	141,21	88,84
G	wholesale and retail trade; repair of motor vehicles and motorcycles	1582,54	1507,57	74,97	5,04	4,97
H	transportation and storage	435,08	344,34	90,74	26,60	26,35
I	accommodation and food service activities	701,76	373,26	328,50	86,05	88,01
J	information and communication	195,08	173,17	21,91	12,18	12,65
K	financial and insurance activities	149,23	147,40	1,83	0,64	1,24
L	real estate activities	142,92	101,23	41,69	41,46	41,19
M	professional, scientific and technical activities	430,77	383,79	46,98	12,47	12,24
N	administrative and support service activities	690,85	599,55	91,30	15,17	15,23
O	public administration and defence; compulsory social security	486,77	695,03	-208,26	-31,84	-29,96
P	education	335,23	347,13	-11,90	-3,09	-3,43
Q	human health and social work activities	303,62	325,98	-22,36	-6,95	-6,86
R	arts, entertainment and recreation	184,54	111,55	72,99	63,60	65,43
S	other service activities	168,46	154,41	14,05	9,13	9,10

In Table 1, we can also notice that in the sectors O – public administration and defence; compulsory social security, P – education and Q – human health and social work activities, the pandemic has a ‘negative’ impact. It means that the created regression model predicted a higher inflow of unemployed people than really occurred. For these three sectors, this result is logical. At the time of the pandemic, the need for employees in these sectors increased significantly, thus reducing their unemployment, which is expressed by a reduction in the inflow of new jobseekers. This fact is expressed in Figure 2 for all sectors.

In March 2020, the first strict measures came into force in Slovakia to prevent the spread of COVID-19, which manifested itself in almost all sectors immediately in April 2020. As a result, the inflow of new jobseekers in individual sectors increased from 15% to almost 560%, compared to the predicted number. The situation is the same in sectors P and Q, where the inflow of unemployed increased in April 2020 (by 29% and 16%, respectively). Still, in the following months, the situation stabilised, and throughout 2020, the inflow of new unemployed was lower than that predicted by the models. In sector O, there were lower numbers than predicted during the whole pandemic period.

We will provide more detailed data for the sectors where the impact of the pandemic has been identified as the strongest. In sector F – construction, the impact of the pandemic on the inflow of new jobseekers was the strongest (Figure 3). In this sector, an average of 241 more people became unemployed per month than that predicted by the regression model, which means an average monthly difference of almost 141%. The relative percentage impact of the pandemic in this sector was quantified at almost 89%, which means, on average, 89% more new unemployed compared to the predicted number. Such a strong impact of the pandemic could be expected in this sector. In 2020, restrictions on the functioning of shops, construction companies and offices, and also people’s fear of an unknown new disease created such a situation on the market where the construction sector did not function as usual and the companies laid off many employees.

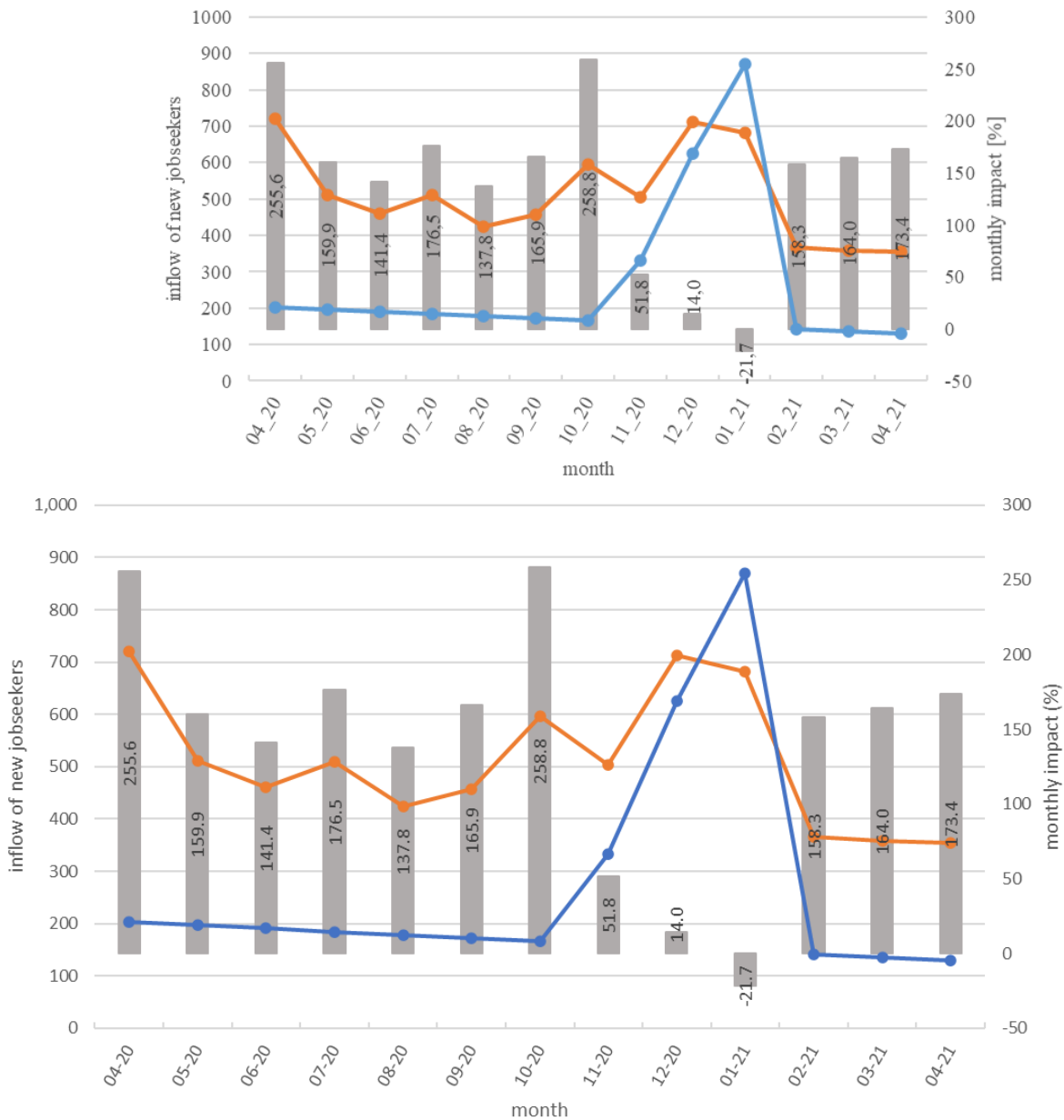
Fig. 2: Impact of the pandemic on unemployment in sectors O, P and Q.



Source: own elaboration.



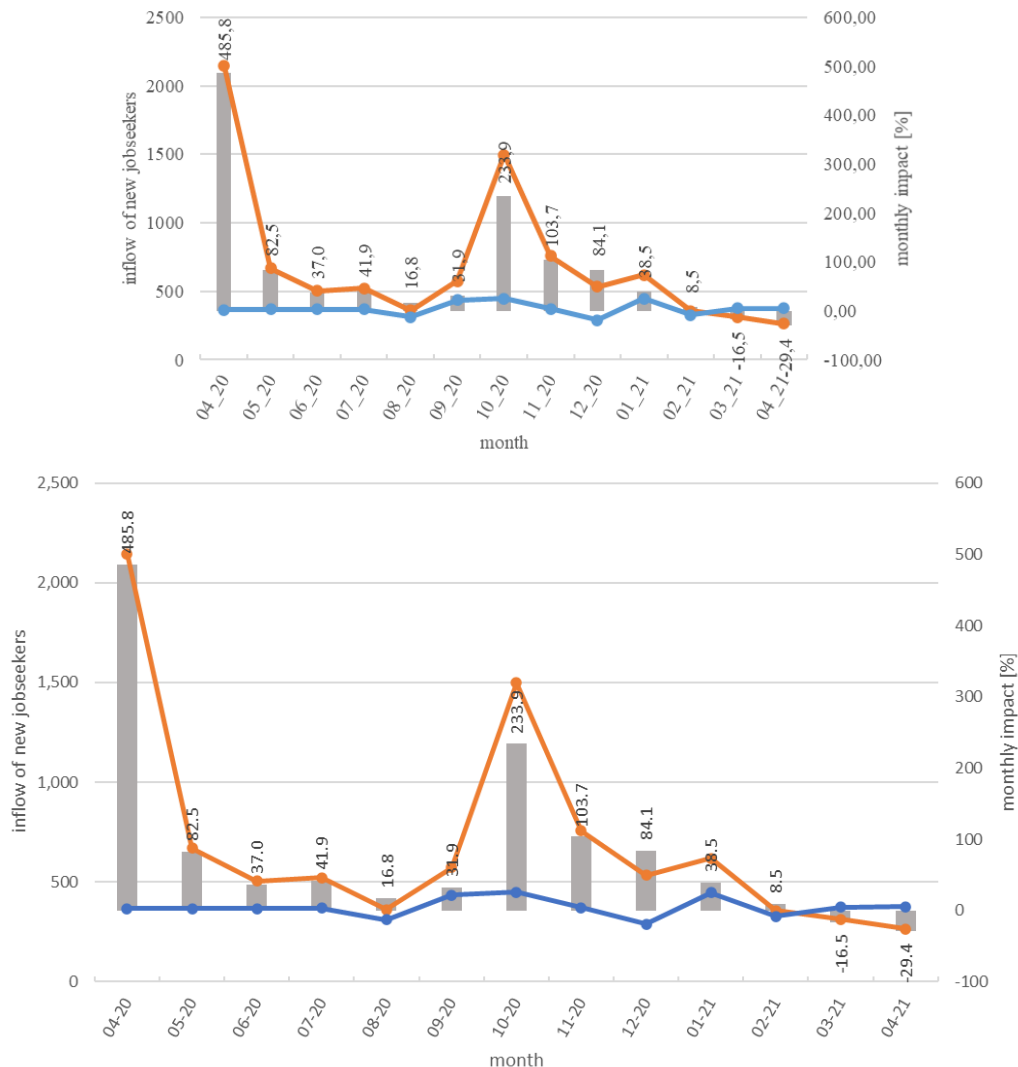
Fig. 3: Monthly impact of the pandemic on unemployment in sector F – construction.



Source: own elaboration.

In January 2021, the situation was the opposite. The predicted number of new jobseekers was higher than the actual number. In November and December 2020, the real numbers of newly unemployed people were significantly lower than was expected. This fact can be easily explained. Under normal circumstances, employment in this sector is very seasonal and redundancies occur during the winter months because the operation of this sector is limited. The model by which the values were predicted takes this fact into account based on data from previous years. However, in 2020, there were significant redundancies throughout the whole pandemic period; in April, the increase in new jobseekers was almost 256%, and during the consecutive months, it also reached a very high value. It can, therefore, be reasonably assumed that many of these already unemployed people were those who would have been

Fig. 4: Monthly impact of the pandemic on unemployment in sector I – accommodation and food service activities.



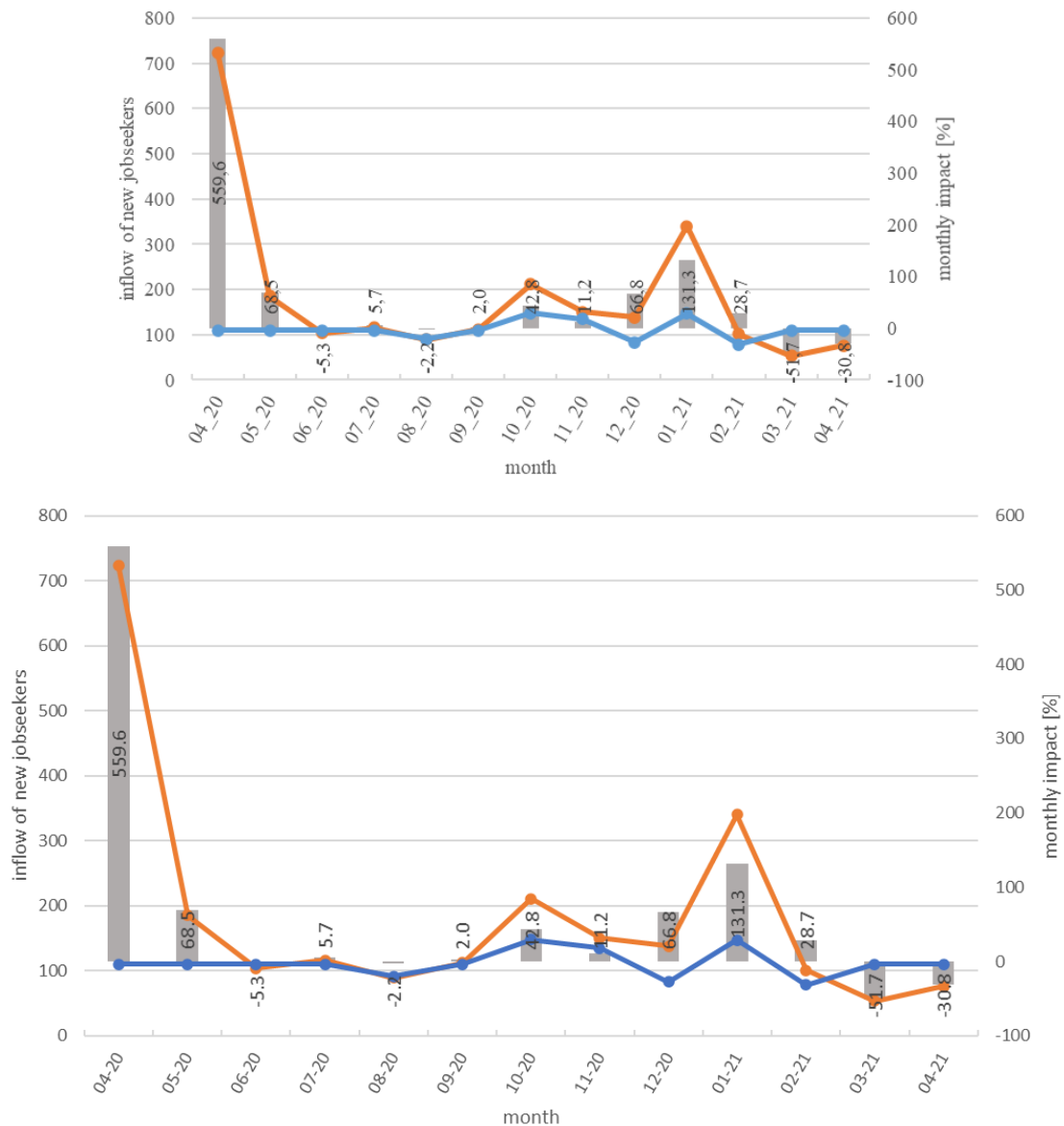
Source: own elaboration.

unemployed only in the winter months. In any case, it can be said that the impact of the pandemic on this sector has been very strong, and the removal of the consequences will require state assistance.

The second sector where the pandemic had a very strong impact was sector I – accommodation and food service activities. In this sector, the operations of the companies in Slovakia were completely stopped, and due to the slow help for the entrepreneurs by the state, these companies were not able to keep all their employees for a long time, and they were laid off. As a result, the monthly inflow of jobseekers in this sector increased by, on average, 329 people, which is an 86% difference from the prediction. Therefore, the impact of the pandemic was quantified at 88%, which means that during the observed pandemic period, an average of 88% more people became unemployed than expected. Figure 4 shows the evaluation results.

The situation was worst at the beginning of the pandemic in Slovakia in April 2020, when the first stringent measures came into force by the state and the operation of companies in this sector was completely stopped. As a result, the inflow of new jobseekers increased by 486% this month compared to the predicted number. In the consecutive months, there was moderation; but in October 2020, the second wave of the disease started in Slovakia and the measures were tightened again. During the last 2 months under review, the situation had stabilised, entrepreneurs in this sector had received state intervenes and several measures had been relaxed.

Fig. 5: Monthly impact of the pandemic on unemployment in sector R – arts, entertainment and recreation.



Source: own elaboration.

The third most affected sector in Slovakia was the sector R – arts, entertainment and recreation. In this sector, the inflow of new jobseekers increased by, on average, 73 per month, representing a difference of almost 64% on average, compared to the prediction. This sector was also often mentioned in the Slovak media as one of those that needed and demanded the highest state help and compensation due to the restriction of their activities. The impact of the pandemic on unemployment in this sector was quantified at almost 65%, which means that the number of new jobseekers increased by 65% over the period under review, compared to the average predicted number. The situation is shown in Figure 5.

The worst situation was in April 2020, when the cancellation of all cultural events increased new jobseekers in this sector by almost 560%. The situation was milder during the summer of 2020, as anti-pandemic measures were also mild. However, deterioration occurred in the winter when measures were tightened during the second wave of the disease. In recent months, the situation has

stabilised. Individuals and companies in this sector are recipients of state interventions. Recently, anti-pandemic measures have also eased and some cultural events have been allowed.

The quantification of the impact of the pandemic on the inflow of new jobseekers in other sectors of economic activity is given in Table 1.

## DISCUSSION

In Slovakia, the impacts of the implemented anti-pandemic measures were strongest in the sectors F – construction, I – accommodation and food service activities and R – arts, entertainment and recreation. Especially after the arrival of COVID-19 in Slovakia, stringent measures were introduced, which significantly reduced or even completely stopped the operation of companies, which was most reflected in the three sectors mentioned. These three sectors were also often mentioned in the media in Slovakia as those that demand the highest state help and financial interventions to mitigate the impacts of the pandemic. State aid had been slow, there had been many redundancies and the inflow of new jobseekers increased significantly. In April 2020, it showed an increase of 256%–560%, compared to the estimate obtained from a regression model based on past data. During 2020 and the first 4 months of 2021, the situation changed differently. There was an improvement only in the winter in the construction sector, which we assume is rather the effect of earlier redundancies of seasonal workers who would have been laid off anyway. In this sector, the impact was very strong throughout the whole period under review.

The study of the effects of the COVID-19 pandemic on destitution in the UK was also addressed by Bhattacharjee and Lisauskaite (2020). The authors also applied the counterfactual approach in their study. In a cross-sectoral comparison, the authors found that in the UK, the highest impacts of COVID-19 occurred on construction and manufacturing, with differences of almost 568% and 279%, respectively, between the destitution levels with and without a pandemic. The mining sector was also affected; the impact was quantified at almost 213%, and the public sector with an impact of almost 206%. On the contrary, in the finance sector, the impact was negative, at a level of poverty reduction of almost 3%.

Falk et al. (2021) found that the leisure and hospitality sectors recorded a higher peak in unemployment (39.3% in April 2020) than any other sector. In April 2021, the unemployment rate in these sectors was 10.8%, which was the second highest unemployment rate in the period under review, showing a decrease of 28.5% compared to the previous year. However, the increased unemployment rate is not limited to sectors providing personal services. Workers whose last job was in mining and extraction industries have seen rising unemployment since the onset of the recession; in April 2021, they showed the highest rate (14.3%) among all workers in all sectors. The lowest rate in April 2021 was for workers whose last job was in government (2.3%), financial activities (2.7%) or in the education and health sectors (3.4%). Compared to most other sectors, these sectors had a relatively low unemployment rate from February 2020 to April 2021. However, some workers were more likely to lose their jobs within these sectors than in other sectors at the beginning of the recession. For example, some studies suggest that since the beginning of the pandemic, low-wage workers in the leisure and hospitality sectors and other service sectors have experienced disproportionately large job losses.

We consider the weakness of this study to be the fact that the created regression models did not contain several explanatory variables that would help improve their predictive ability and better describe the variability in the development of the inflow of new jobseekers. Although the created regression models reach 45.2%–95.2% of the explained variability ( $R^2$ , the vast majority of models reach the level of 70%–95%), by including several factors that could explain the inflow of new jobseekers, this predictive ability could be further increased. Therefore, the future direction of this study lies in, in addition to supplementing the latest data after their publication by COLSAF SR, the refinement of the created regression models, and thus achieving even better evaluation results.

## IMPLICATIONS FOR PUBLIC POLICIES

As already mentioned, it is appropriate to quantify the unequal impact of anti-pandemic measures and, based on the results of such studies, to adjust the targeting, amount and intensity of state aid to units in the most affected sectors. In some sectors, the impact of the pandemic turned out to be even negative, and employment in these sectors increased. Using the results of this study, we think that

state intervention measures should be intensely focused on increasing employment in the most affected sectors (such as construction), supporting creating new jobs or maintaining existing jobs. These measures in Slovakia are not yet sector oriented or not targeted at the most affected sectors, which is probably a mistake. The EU could also help in this by allocating the funds for implementing such measures and emphasising the strong need for change and rapid response of public policies to the problems caused by the COVID-19 pandemic, as stated in the study by Kovac et al. (2020).

In some sectors, the impacts on unemployment have proved to be milder, if not negative (increase in employment during a pandemic, such as in education). Employment-oriented intervention in such weakly or unaffected sectors will then have a weak effect, although the grants will be exhausted. Such an intervention is then likely to impact the state budget positively, but not to the extent that would have been if the measures to mitigate the effects of a pandemic would target the most affected sectors. Such an intervention is undoubtedly needed for the three mentioned most affected sectors in Slovakia, that is, F – construction, I – accommodation and food service activities and R – arts, entertainment and recreation, although the construction sector is still the most affected.

In any case, the results obtained in this study can be immediately used in practice in setting the parameters of functioning, eligibility and allocation for intervention instruments of active labour market policy, aimed at increasing employment in selected, most affected sectors, whether in the form of grants for the companies or for unemployed individuals.

## CONCLUDING REMARKS

The COVID-19 pandemic is currently a global problem faced by all the countries around the world. One of the countries affected by this COVID-19 pandemic is the Slovak Republic. The adoption of measures by the Slovak government to prevent the spread of COVID-19 created unemployment in various economic sectors in Slovakia. This paper focused on analysing and quantifying the impacts of the COVID-19 pandemic and termination measures to prevent its spread on unemployment in various sectors of economic activity in Slovakia using a counterfactual approach. All sectors from A to S were analysed according to NACE categorisation. Based on the analysis results, among the least affected sectors by COVID-19 were O – public administration and defence; compulsory social security, P – education and Q – human health and social work activities, due to the increased need for employees in the given sectors. The sectors most affected by the impact of the COVID-19 pandemic were F – construction, I – accommodation and food service activities and R – arts, entertainment and recreation. The results of identifying the sectors most affected by the pandemic are not so surprising, as the strong impact on the increase in unemployment in them has been publicised in Slovakia. However, the level of impact up to 89%, 88% and 65%, respectively, in them may sound surprising, especially when we consider that these are average values, and in some months, the increase in unemployment was even higher. The high impact of the COVID-19 pandemic in the construction sector was caused by the fact that the Slovak government introduced strict measures to stop the spread of COVID-19. As a result, many institutions operating in Slovakia stopped providing their services for a long time. This pandemic also affected the psychological side of employees in terms of job loss and subsequent financial distress. The high impact of the COVID-19 pandemic in the accommodation and food service activities sector was caused by the suspension of business activities in Slovak companies. It was again reflected in employees due to the Slovak government's failure to compensate entrepreneurs operating in Slovakia. Companies decided to reduce the damage caused by laying off their employees, thus increasing unemployment in the sector. A similar situation occurred in the other analysed economic sectors in Slovakia, which faced the highest impact of the COVID-19 pandemic, as any assistance from the Slovak government was at a level that could not cover all the damages caused by the disease in the sectors.

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