ORIGINAL SCIENTIFIC PAPER

Economic Activity and Employment in the Non-Financial Sector of Bulgaria under Conditions of Covid-19 Crisis. Sectoral Vulnerability Assessment

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ABSTRACT

This article examines the economic consequences in the non-financial sector of Bulgaria as a result of the Covid-19 pandemic. The development of the pandemic in Bulgaria is analyzed from a medical point of view and it is concluded that the country will need periodic lockdowns (restrictions by the government and health authorities) of some economic sectors for at least a few more years. The analysis of the data from Bulgaria and around the world shows that the lockdowns have general economic consequences, but mainly affect certain sectors. The main goal of the article is to identify the most vulnerable to social distancing industries in the Bulgarian economy. To this end, the article develops a methodology based on a set of criteria for assessing sectoral vulnerability to lockdowns. The methodology includes an assessment of sectoral vulnerability to automation, percentage of self-employed in the sectors, Lockdown index, Home-office index, Teamwork, and Customer-facing. We have found that the most vulnerable sectors in Bulgaria is the Hotel and Restaurant Business sector, and Air transport.

Key words: *COVID-19, pandemic, non-financial sector, sectoral vulnerability, lockdown*

JEL Classification: E24, E32, J21, J23

INTRODUCTION

What is specific about the COVID-19 pandemic is that it is an exogenous factor of economic growth. The specificity of addressing the health consequences of the virus requires imposing restrictions mainly on the mobility and social life of people. On the one hand, there are no purely economic and financial factors for the crisis. On the other hand, addressing the health aspect of the crisis concerns some sectors differently if compared to others. Some sectors, such as health, land transport and construction, even turn out to be favored, their growth is stimulated both by the created situation with COVID-19 and the support that is not precisely targeted according to the needs of the sectors.

If the COVID-19 crisis lasts longer, it would be useful for economic policy to identify the most vulnerable sectors in order to make support more targeted, rather than supporting sectors and businesses that do not need support, which only creates inflation. This is the purpose of the present study. The object is non-financial enterprises in Bulgaria by sectors. The subject of research is the economic consequences of the pandemic on non-financial enterprises.

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Methodologically, a literary, comparative, and descriptive graphical analysis at sectoral level will be used to achieve the purpose. Chapter one collects and analyzes data on the development of the pandemic. By analogy with the world trends in the spread of the virus and the introduced restrictions on social contacts, a forecast is made for the development of the pandemic in Bulgaria. Chapter two applies to the classification and comparison of the consequences of the pandemic in Bulgaria and around the world. The third chapter summarizes data from various international studies on the effects of the pandemic on the non-financial sector of economies. The fourth chapter with the help of graphical, descriptive analysis presents the effects of the pandemic on the non-financial sector of the economy in Bulgaria. We create a tabular model for assessing the vulnerability of the non-financial sectors in Bulgaria in the fifth chapter, compare and classify the results. The methodology includes an assessment of sectoral vulnerability to automation, percentage of self-employed in the sectors, Lockdown index, Home-office index, Teamwork, and Customer-facing.

The article will first describe the development of the pandemic from a medical point of view. This is an important component of the analysis because, as mentioned above, it is an exogenous crisis, which in this case is directly dependent on the development of the health factor, including: the rate and fluctuations in the spread of the infection, the approaches to dealing with it that have economic consequences, i.e. those that directly restrict certain economic sectors. Second, the general economic consequences for the world, as well as for individual countries and regions, including Bulgaria, will be discussed. Third, the impact of the pandemic in the non-financial sectors of some countries will be analyzed as an introduction to getting acquainted with the consequences in the non-financial sector of Bulgaria until the first quarter of 2021. In the last section of the analysis, based on various indicators and indices developed in scientific literature, a cumulative method for assessing sectoral vulnerability in Bulgaria will be developed. This method will be used to analyze the sensitivity of the various non-financial sectors of the Bulgarian economy to the consequences and restrictions associated with the pandemic and draw conclusions on the future support policy.

GENERAL HEALTH CONSEQUENCES IN THE WORLD AND IN BULGARIA FOR 2020 AND EARLY 2021.

The COVID-19 virus occurred in Wuhan City of Central China at the end of 2019. It was identified when in December people developed pneumonia of unknown cause that did not respond to the known methods of treatment. It has rapidly widespread and on March 11, 2020, the World Health Organization (WHO) has declared the novel coronavirus (COVID-19) outbreak a global pandemic. By the end of July 2021, there were already more than 198 million confirmed cases of people infected with the virus worldwide, of which over 4 million deaths, and nearly 15 million active cases (Worldometer, 2021).

Figure 1. shows the dynamics of spread of the virus around the world from the beginning of the pandemic in the spring of 2020 to July 2021. Both charts show a trend of increasing the cases in recent weeks; the world is on the verge of a fourth wave of COVID-19.
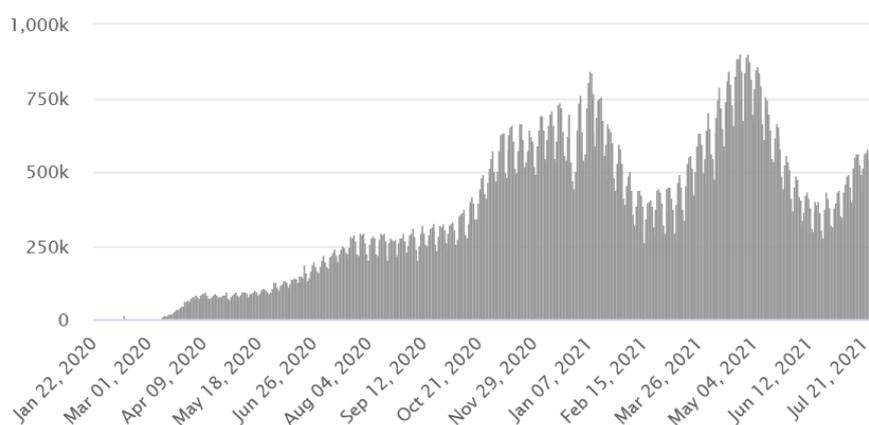
Figure 1. Daily New Cases around the world
Source: Worldometer. 2021.

Bulgaria reported the first confirmed case of coronavirus disease (COVID-19) on March 8, 2020. Since then, the statistics of prevalence and mortality has been following the global trends with a slight delay of several weeks, which can be seen in **Figure 2**. As of the end of July 2021 Bulgaria has already reported over 424 thousand officially registered cases of infected, of which over 18 thousand death cases, nearly 400 thousand recovered cases and over 8 thousand active cases (Unified information portal, 2021).
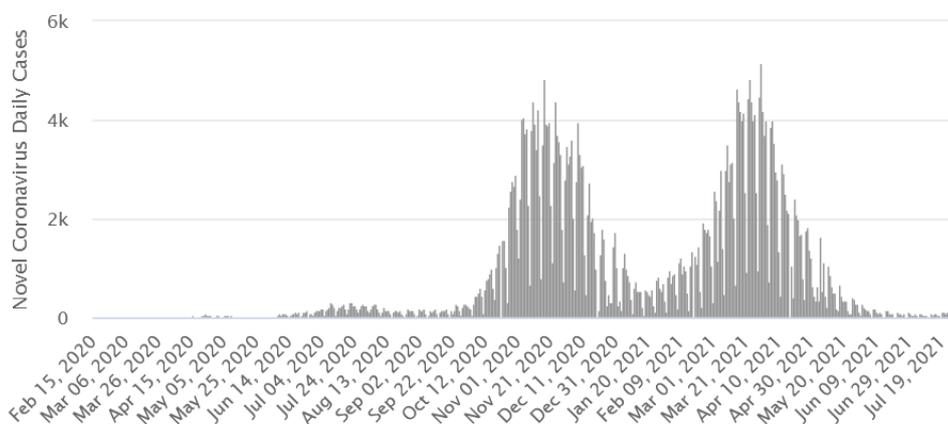
Figure 2. Daily New Cases in Bulgaria
Source: Worldometer. 2021.

Towards the end of July, the origination of the fourth wave in Bulgaria is not clearly visible graphically, but the cases are increasing and the logic of the first two waves suggests that we will probably continue to follow the negative trends in global statistics. This conclusion is also supported by the low vaccination rate in Bulgaria compared to the rest of the world. As of September 2021, the fully vaccinated population in Bulgaria is 15% compared to 30% on average for the World.

On the one hand, the positive aspect in the fight against the pandemic are vaccines that reduce mortality; on the other hand, the negative aspect are new mutations of the virus such as Delta variant, which so far do not allow a permanent reduction in the number of infected. These COVID-

19 mutations either multiply and spread more rapidly or are more resistant to vaccines. This means that the need for restrictions in social life and some economic activities will remain.

Social distancing measures are different types with different scope and stringency and can be categorized as partial and full. In the case of full measures, a quarantine blockade of entire regions or countries is required. In the strictest form, the entire population is forbidden to leave their homes, unless it is absolutely necessary. Physical contact is allowed only between members of the same household. Only basic essential organizations, such as grocery stores, pharmacies, and hospitals, operate. The full restrictive measures are imposed for a more limited period of time (Fiscal Council of Bulgaria, 2020). The partial measures restrict activities related to mass events and crowing of people, and can be (Covid - 19 Healthdata, 2021.):

- Closure of schools and educational institutions at all levels of education (primary, secondary and higher education), introduction of distance learning;
- Suspension of insignificant activities, closure stadiums, cinemas, shopping malls, museums and playgrounds, bars and restaurants (they can offer home deliveries), closure of retail stores and services such as beauty salons and hairdressing salons. Only suppliers of basic goods and services work. Fines are imposed on offenders.
- Restrictions on travel. Movement between settlements is prohibited. Only those who provide basic services and returning residents isolated in foreign territories are admitted. Travel in private cars is limited only for the purposes of access to work and basic services. Public transport is stopped.
- Gatherings are limited. Restrictions can be applied both to public and private gatherings (a definite of people in one place).
- Businesses are temporarily closed. These restrictions do not apply to all companies but may include a particular group such as bars and restaurants.
- Contact persons are tracked and quarantined.
- Remote forms of employment are encouraged.
- A mask is used, and distance is observed in contact with people outside the household.
- Information campaigns for prevention and vaccination.
- Mass testing policy.
- Promoting vaccination against COVID-19 by different approaches – incentive and prohibitive.

The measures applied by the health authorities differ not only in their type and stringency, but also in the timeliness and speed of their application. In general, they cause, in addition to the negative economic consequences, resistance and boycott by a part of the society. The gradual combination of different partial measures allows a large part of the economy to continue to operate. Another approach is to alternate full measures with partial measures (in the form of 'dance'). In any case, there is a risk of early or excessive loosening of the measures.

Figure 3 shows how the measures to restrict social contacts, applied by the government since the start of the pandemic, affect the mobility of people compared to the usual levels for Bulgaria.
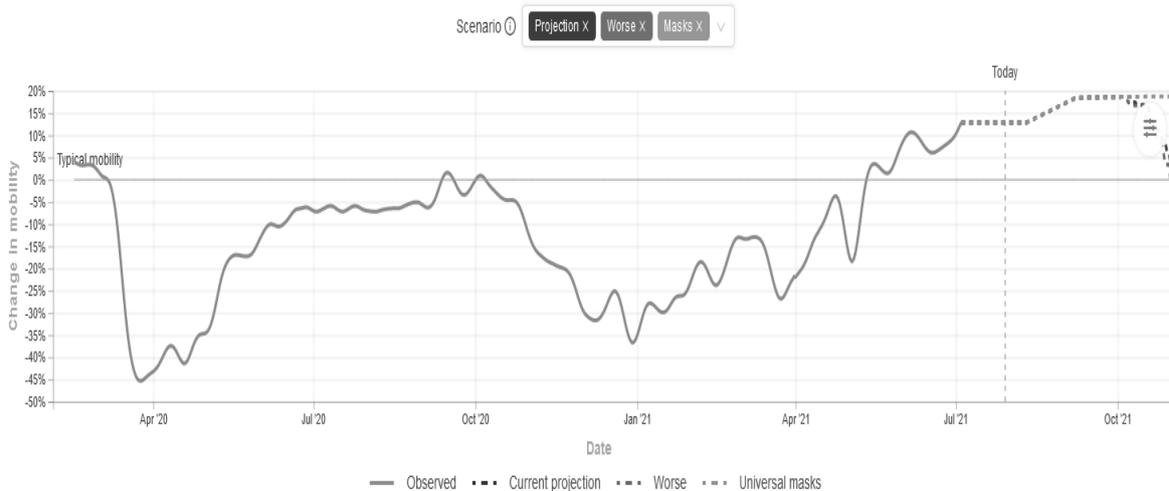
Figure 3. Social distancing
Source: Covid - 19 Healthdata. 2021.

Mobility should change with the application or easing of the measures for social distancing, so data should give us an idea of the extent to which the restrictive measures of the government have actually led to an increase in social distancing. Individual decisions for mobility restriction, despite the government restrictions, also have an impact on the model because 'mobility' in the model is based on anonymous mobile phone tracking data provided by technology companies to combat COVID-19. All other conditions being equal, it is accepted that mobility is an indicator of greater potential for personal contact that can contribute to the spread of the disease. When mobility is high, the risk of spreading COVID-19 is also considered to be high. However, taking precautions, such as keeping distance between individuals during gatherings, wearing face masks in public areas and washing hands regularly, can significantly reduce the risk of transmitting the disease. The model also provides three forecast scenarios for the development of the situation (Covid - 19 Healthdata, 2021.):

- Continuation of the trend (average - reference scenario) under equal other conditions.
- Worsening of the situation (unfavourable scenario), in which new Coronavirus mutations begin to spread more rapidly and/ or the use of masks among vaccinated persons begins to decrease exponentially one month after the end of the vaccination course.
- The 'mask' scenario (favourable scenario) is based on the same assumptions as the reference scenario, but also assumes that 95% of the people wear masks in public areas. It is stated that the use of masks at this level can reduce the transmission of the virus by more than 30%.

In the unfavourable scenario and the average reference scenario, the forecast from the model is that mobility in Bulgaria will have to be significantly limited by October. Only in case of over 95% wearing masks we can rely on maintaining the current mobility, but such a percentage in Bulgaria is unattainable. Currently, such a level of wearing masks is found only in Singapore. Based on this chart, it can be concluded that social distancing must also be maintained in the coming months in order to limit the spread of COVID-19. At the same time, the measures for social distancing have a detrimental effect on the economy, but there is no alternative at this stage, because there is still not enough clarity about the effectiveness of vaccines against new mutations of COVID-19.

The conclusions from the above analysis at the time of writing this article are that the pandemic has not subsided at all, either in the world or in Bulgaria. In connection with the emergence of newer mutations of the virus, which are more resistant to vaccines, precise forecasts cannot be

made for the development of the situation and the recovery of social and economic life. Economies must be prepared for a long regime of opening and closing, and people for a long regime of social distancing. Some studies have found that the application of strict protocols to several sectors is generally preferable to the application of softer protocols to a larger number of sectors both in terms of health and economic benefits. (Janiak, Machado & Turén, 2021.) It would be useful for the economic management of the crisis to get to know in more detail the economic consequences of the pandemic both in the world and in Bulgaria, as well as to identify the most vulnerable (most affected by closures) economic sectors in order to refine the economic support policy in Bulgaria.

GENERAL ECONOMIC CONSEQUENCES OF THE PANDEMIC FOR THE WORLD AND BULGARIA

The onset of the COVID-19 pandemic and the restrictive measures imposed to address its health consequences have led to a sharp contraction of economic activity in all major economies. The COVID-19 pandemic has raised the global index of uncertainty to historic levels – **Fig. 4**. Uncertainty was declining relatively rapidly as early as the end of March 2020 (Altig & others, 2020.), with the peak of the negative economic effects of the restrictive measures observed around May 2020. Data from international trade confirm that the negative effects of COVID-19 in exporting countries persist until August 2020, but their scale decreases over time. (Hayakawa & Mukunoki, 2021).

The relatively rapid recovery of confidence and economic activity, especially in some large economies such as China, has allowed the overall global economic decline for 2020 to be limited to just 3.3%. The Chinese economy even managed to report growth of 2.3% for the year, the decline for the United States was 3.5%, Great Britain – 9.9%, Germany – 4.9%, France – 8.2%, Russia – 3.1%. (World Economic Outlook, 2021.)
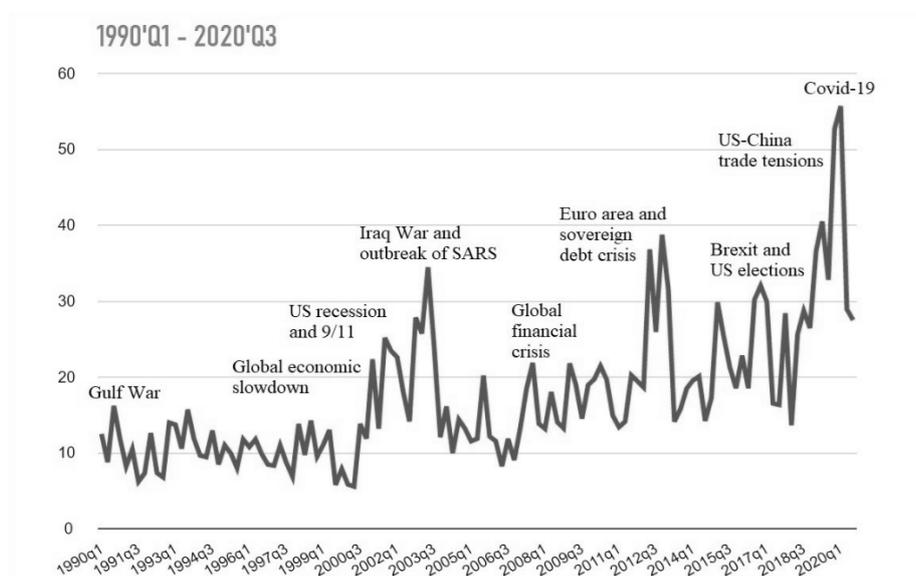
Figure 4. Global Index of Uncertainty
Source: International Monetary Fund, through Murginski, 2021.

The global economy is expected to expand by about 6% in 2021, the fastest pace in 80 years, mainly due to the strong recovery of several major economies. However, many emerging markets and developing economies continue to struggle with the COVID-19 pandemic and its aftermath. The world production will be about 2% below pre-pandemic forecasts at the end of 2021. Among low-income economies, where vaccination is lagging behind, the effects of the pandemic are

reducing the achievements in poverty reduction. These forecasts are included in the June issue of the World Bank's Report on Global Economic Prospects (Global Economic Prospects, 2021). It should be noted, however, that these economic forecasts do not reflect the purely medical aspect of the problem that we have already addressed in **chapter 1**. Uncertainty about the emergence of new mutations in the virus that are resistant to vaccines and new waves of the pandemic remains high.

In the pre-pandemic year of 2019, the Gross Domestic Product of Bulgaria increased in real terms by 3.4%, exceeding 3% for five consecutive years. The leading factor of growth is final consumption, which increased by 5.7% compared to 2018. Since mid-2019, there has been a slight slowdown in the real growth of GDP to 3.2% and 3.1%, due to the slowdown in the global economy that has already begun. The crisis caused by the global pandemic dramatically changed the dynamics of economic activity in the Bulgarian economy. (Institute for Market Economics, 2020). With the introduction of the state of emergency in Bulgaria on March 13, 2020, strong restrictions on social and economic activities were imposed. Hotels, restaurants, bars, beauty salons, tourist offices, cinemas, theatres, malls, retail stores, etc. completely closed. Some manufacturing companies ceased their operations due to disruptions in the international supply chains. Travelling was restricted, checkpoints were established at the exits of the regional centres, the mandatory fourteen-day quarantine of Bulgarian and foreign citizens arriving in Bulgaria was introduced. (Petranov, Zlatinov, Velushev & Karaivanov, 2020). The shock on transport is evident from the following statistics:

- The number of trucks passing through the main border checkpoints of the country reduced by 30% - 40%;
- The Bulgarian Airlines Association announced that the expected losses only in the months of March, April and May would amount to EUR 34 million (Customs Agency, 2020);
- Only in March, the revenues of the Sofia-based companies 'Metropolitan', 'Stolichen Avtotransport' and 'Stolichen Elektrotransport' shrank by EUR 3.3 million.

The Gross Domestic Product decreased by 8,5% in real terms compared to the second quarter of 2019 and by 10% compared to the first quarter of 2020. According to data of the Employment Agency, in the six weeks after the introduction of the state of emergency in the country, more than 105 thousand new unemployed people have been registered in the employment offices and only 16 thousand have started working for the same period. The number of registered unemployed reached the highest value of 295,5 thousand people in May or by over 112 thousand more compared to same month of 2019. (Institute for Market Economics, 2020).

The easing of restrictive measures and the opening of businesses in May – June 2020 have led to a resumption of the activity in July. The confidence of the business and consumers was increasing; the industrial production was beginning to recover. However, activity in the Services and Retail Trade sectors has been hampered by the loss of consumer incomes, the increase in savings and the continued restrictions on some activities. (OECD economic reviews – Bulgaria, 2021).

In the end, the Bulgarian economy contracted by 4.2% in the crisis year of 2020 to BGN 118.6 billion at current prices, according to preliminary data of the National Statistical Institute (NSI), as the decline was below the EU and Euro Area average. According to Eurostat, the decline in the EU economy is 6.2% and the Gross Domestic Product of the Euro Area countries is minus 6.6% in 2020. Despite the severity of the pandemic and economic crisis, in 2020 the unemployment rate increased by only 0.9 percentage points, compared to 2019, and reached 5,1%, respectively 5,4% for men and 4,8% for women. The number of unemployed reached 168,6 thousand by the end of 2020, according to NSI data from March this year. The reported increase in unemployment is much less negative that during the previous global economic crisis of 2008-2010. (Bulletin for macroeconomic development, 2021).

DYNAMICS IN THE NON-FINANCIAL SECTORS OF DIFFERENT COUNTRIES

At the moment of completion on this article, there is no available data regarding other countries that are more similar (in terms of size and economic development) to Bulgaria. Initially, with the introduction of the restrictive measures, the production and sale of vehicles and spare parts, as well as their service maintenance, were among the most affected economic activities because some manufacturers were forced to close their factories in a number of countries. Transport was also strongly affected due to the closure of borders, introduction of quarantine blockades and decline in tourism. In air transport, already requested and paid reservations were cancelled. In the first week of April alone, there was a drop of over 90% in the scheduled flights to countries such as the United Kingdom and Germany (Fiscal Council of Bulgaria, 2020). The introduction of quarantine blockades, the restrictions on mass events, the distance working of employees, etc. significantly reduced the passenger flow in the public urban transport. In retail trade, a number of companies faced difficulties and delayed the payment of their rents, the large shopping centres closed due to the ban on crowding of people. Some of the catering establishments - restaurants and cafes temporarily relied only on home deliveries of food, thus compensating at least a small part of the decline in their income. (Fiscal Council of Bulgaria, 2020).

Some researchers have found that countries with a better virus control strategy, healthcare opportunities and relatively higher share of employment in the primary sector have suffered lower losses (Goswami &, 2021). It can be argued that labour-intensive industries are more vulnerable, with the footwear industry suffering a decline until August 2020, the production of transport equipment showing a decline especially in April and May 2020. In other industries, such as those offering medical products or digital consumer services, software and computer services, electronic entertainment, positive effects of COVID-19 have been observed. (Hayakawa & Mukunoki, 2021).

Another research claims that the sectors with high contact and higher vulnerability to infection are the wholesale and retail, hotels and restaurants, entertainment and personal services, transport, education, healthcare, and construction. All other sectors can be determined as sectors with low-contact and lower risk of infection (World Economic Outlook, 2021). In general, most sectors have been affected in some way - the primary and secondary industries are suffering due to poor logistics and supply chain problems, the wholesale and retail due to the need to speed up their online services, and the tourism sector is the most affected sector. (Lu & others, 2021).

The greater vulnerability of some industries may depend on the share of self-employed in a given sector; such persons in a given economy are very often not insured or are insured on a minimum income and therefore cannot benefit from business and employment preservation programs. Statistics on the sectoral distribution of this vulnerable employment in Pakistan shows that the lowest percentage of self-employed is observed in the financial sector, supply of utilities (water, electricity and gas), mining and education, while in the agricultural sector, wholesale, retail and real estate they are at most - over 60 % for each. (Sohail, 2019). If such micro-enterprises and self-employed are left without state support, they could not survive for a long time. Data from a study in Pakistan show that most small and micro-enterprises would not survive for more than 5 weeks, if restrictive measures are introduced in a new wave of COVID-19.

Tourism and entertainment industry are the economic sectors that have most been affected by COVID-19 in the world. They report a decline of USD 2,86 trillion for 2020 or more than 50% loss of revenue. (Abbas, & others, 2021) In **Fig. 5**, the percentage change in the number of international tourist trips by geographical regions can be seen for January - May 2019, compared to the same period of 2018, and for January - May 2020, compared to the same period of 2019. For example, Australia's inbound tourism industry is expected to reach a decline of USD 39 to 42 billion in the Gross Domestic Product for 2020. The results show direct losses of 152 000 jobs in tourism, which together with indirect losses, including related industries in the production chain, reach a total of

about 450 000 jobs. (Pham, 2021). The negative effects of COVID-19 extend beyond the direct impacts on tourism-related industries.
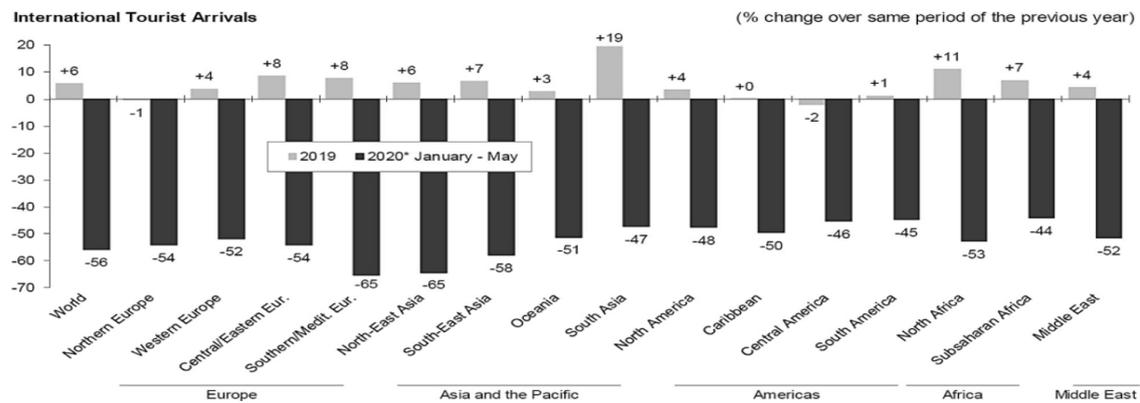

Figure 5. Change in the Number of International Tourist Trips by Geographical Regions
Source: World Tourism Organisation, through: Abbas, J., and others. 2021

The long-term economic consequences for the tourism industry will affect any household, directly or indirectly related to the sector. The pandemic has literally stopped tourism in some periods of 2020 and 2021. Usually, when crises such as natural disasters, epidemics, wars, civil unrest, etc. affect a region, travellers are flexible and move from the destination affected by the crisis to another. Tourism has the ability to attract consumers (visitors) from around the world. In this global pandemic of COVID-19, however, all these alternative plans lose their meaning because the pandemic affects any type of tourism, whether summer, winter, cultural, pilgrimage, health and rehabilitation or otherwise. In addition, the COVID-19 pandemic will have a lasting impact on the tourism industry, as tourists are not expected to regain their previous level of mobility even after its end (Singh & others, 2021). COVID-19 has made life very difficult for the poorer people of society working in tourism. These people have no other choice but turn to new professions, which will also have lasting consequences for the sector.

Apart from tourism, employment in developed economies is declining most sharply in the wholesale and retail, transport, catering, and arts and entertainment sectors. The difference with previous recessions in the last 50 years is that during such recessions the manufacturing and construction sectors were usually most affected. It is also interesting that COVID-19 accelerates the existing structural trends to reduce employment in sectors that are more vulnerable to automation **(Fig. 6)**. Sectors are classified as more vulnerable to automation, if more than half of their employment is in professions classified as routine (Carrillo-Tudela & others, 2016). In these sectors there is a gradual decrease in the share of employees with lower qualifications. Most employees working remotely are in sectors that are classified as less vulnerable to automation, which means that COVID-19 also creates a tendency to switch to teleworking. However, there are some exceptions, for example – sectors that are less vulnerable to automation, but cannot work remotely, including utilities, culture and entertainment, as well as sectors that can work remotely, but are more vulnerable to automation, including administrative services. There are indications that the shock of COVID-19 is accelerating the existing trends, with employment declining in sectors and occupations that are more vulnerable to automation. This is also observed in the movement of labour flows during past recessions, although now the specific sectors most affected are different – wholesale and retail, accommodation and catering. (World Economic Outlook, 2021).
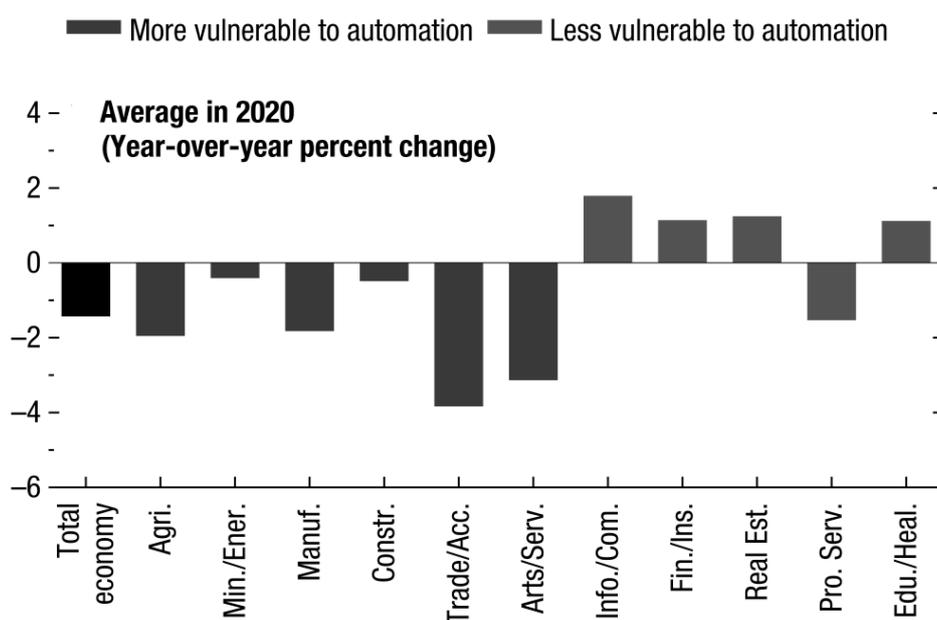
Figure 6. Sectors Vulnerable to Automation

Source: Choi and others (2018), through: World Economic Outlook. 2021.

In general, the effects of COVID-19 on global employment affect young people, low-skilled and women to a greater extent. (World Economic Outlook, 2021). The shock of COVID-19 is likely to have some lasting effects, accelerating the reduction of employment that is more vulnerable to automation and that cannot switch to teleworking.

CHANGES IN ECONOMIC ACTIVITY AND EMPLOYMENT IN BULGARIA BY MAIN ECONOMIC SECTORS.

The growth by economic sectors of the Bulgarian economy in pre-pandemic 2019 is defined as sustainable, because the Industry sector has the highest contribution. At the same time, fundamental sectors such as Trade, Transport, Hotel Business, IT and Telecommunications are reducing their contribution to the overall growth (Yotsov, Zlatinov, & others, 2020).

With the advent of COVID-19, the government's anti-crisis measures, including physical distancing, have had different effects on different sectors of the economy. When applying partial restrictions, the negative effects are focused on some sectors, but are subsequently extended to the related ones and ultimately to the whole economy.

In the second quarter of 2020, when the crisis was most pronounced, compared to the same quarter of the previous year, the largest decline was reported – by 17,7% in the sectors of Trade, Repair of Motor Vehicles and Motorcycles; Transport, Warehousing and Post Offices; Hotel and Restaurant Business and by 4,7% in the sectors of Culture, Sports and Entertainment. The number of persons employed in the second quarter of 2020 was lower by about 123 thousand than in the same quarter of 2019. The contraction is almost entirely due to the reduced employment in the sectors of Trade, Hotel and Restaurant Business (by over 72 thousand) and Industry (by over 36 thousand), whereas, regardless of the crisis, in the sector of Creation and Distribution of IT and Creative Products and Telecommunications, employment increased by over 7 thousand people on an annual basis. Growth is also reported in Healthcare and Social Activities (Institute for Market Economics, 2020).

The pandemic has had an extremely negative impact on international tourism. In pre-pandemic year of 2019 the 'Hotel and Restaurant Business' and 'Travel Agency and Operator Activity' sectors formed directly about 4.7% of the employment in the country; in 2019 the revenues from export of tourist services amounted to about 6.3% of the GDP (Chobanov & others, 2020). With the onset of the pandemic, in June 2020 the total number of foreigners visiting Bulgaria decreased by 75,2%, compared to their number in June of 2019, and the number of those coming for a vacation or excursion was lower by 94,6%.

The University of Oxford has developed a **Stringency index** of government measures. It varies in the range from 0 to 100 points, as the higher value corresponds to tightening of restrictions. For Bulgaria, the index registered a peak of 73.15 points at the end of March 2020 and from May a gradual easing of restrictive measures began as a result of the control of the first wave of the pandemic. Bulgaria was among the EU states with the least restrictions at the end of the second and the beginning of the third quarter of 2020 (Institute for Market Economics, 2020). This explains the relatively low rate of decline in economic activity and employment **(Fig. 7.1, 7.2. and 7.3**) in most sectors during this period, compared to the other member states.
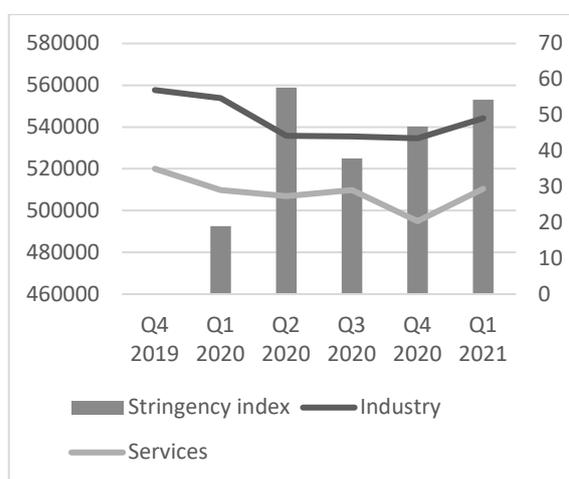
Figure 7.1. Industry and Services*
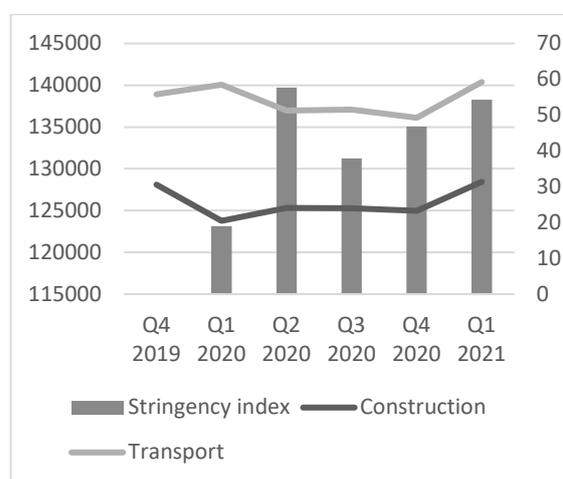
Figure 7.2. Construction and Transport*
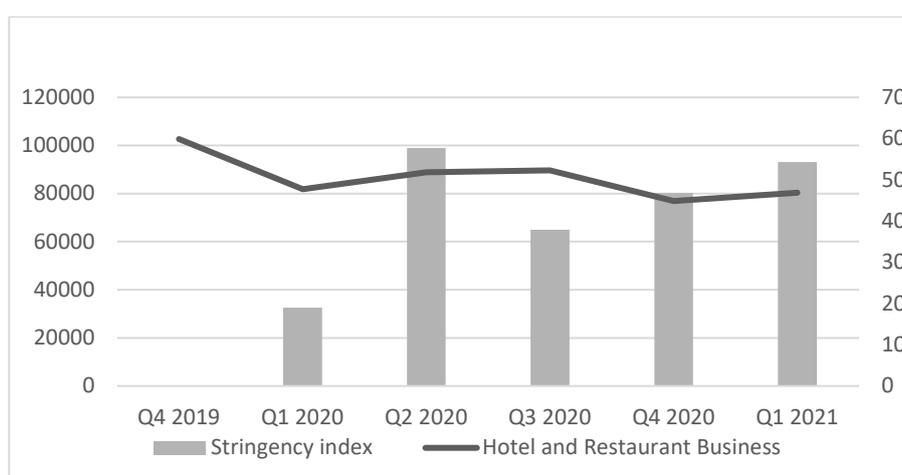
Figure 7.3. Hotel and Restaurant Business*

Sources: Infostat, 2021, and own calculations (Appendix Table)
* On the left scale, employment in the given sector is measured, and on the right scale – the value of Stringency index.

The **Stringency index** is calculated using policy indicators C1 - C8 and H1. The value of the index for each day is the mean value of these nine indicators relating to individual policies, each with a value between 0 and 100. The indicators C1 to C7 and H1 have an additional coefficient corresponding to whether the policy is applied locally (in specific areas/cases) or as a whole throughout the country (COVID-19 Government Response Tracker, 2021).

C – Containment and Closure Policies:

- C1 – school and university closing;
- C2 – workplace closing;
- C3 – cancellation of public events;
- C4 – restrictions on gatherings;
- C5 – closure of public transport;
- C6 – stay-at-home requirements;
- C7 – restrictions on the internal movements between cities/ regions.

H – Health System Policies:

- H1 – public information campaigns.

In **Figure 7.3** we see, albeit in the opposite direction, the symmetrical development of **Stringency index,** which is measured **on the right scale,** and employment, which is measured **on the left scale**, in the Hotel and Restaurant Business sector for the first, third and fourth quarter of 2020, as well as employment in the Services and Industry sectors for the whole of 2020. Interestingly, in all observed sectors there is growth in the first quarter of 2021, despite the increased Stringency index. This can be explained by the adaptation of the business to some extent to the conditions of the pandemic and the restrictions associated with it.

The results and analyses of 2020 presented above show that the government's restrictive measures have a different impact on the non-financial sectors of the economy and the policies to support them need to be refined. The unnecessary support of some sectors has shown that it can put inflationary pressures on the economy, while the insufficient support of others can lead to lasting negative effects in some sectors, restructuring employment and thus increasing poverty and inequality, the latter being particularly strong in 2020. It would be useful to try to analyse the vulnerability of the main non-financial sectors of the economy with regard to the pandemic-related closure. This knowledge can be used not only for the current crisis, but also for subsequent similar trials that Bulgaria and humanity as a whole may face in the future.

In pre-pandemic year of 2019, the **Industry** sector was the basis of economic growth. Subsequently, it was affected by the first wave of the pandemic and reported a strong decline in the months of March, April and May 2020, after which it began to recover in June 2020. Both in the world and in Bulgaria, the industry is coping relatively well with the crisis, is recovering quickly, and by June 2021 in Bulgaria it is moving around the norm for the season - with an index of 108,3 for 2019, the index for 2021 is 109,6 **(Fig. 8)**(Infostat, 2021).
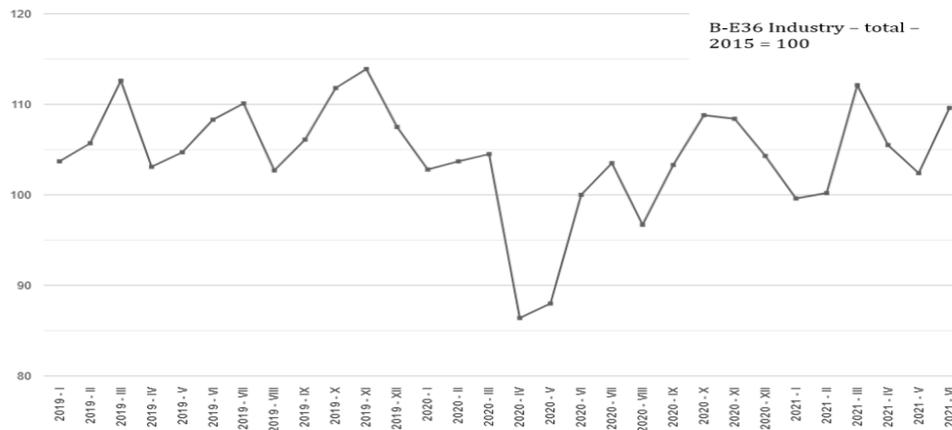
Figure 8. Industrial production indices, calendar adjusted data.
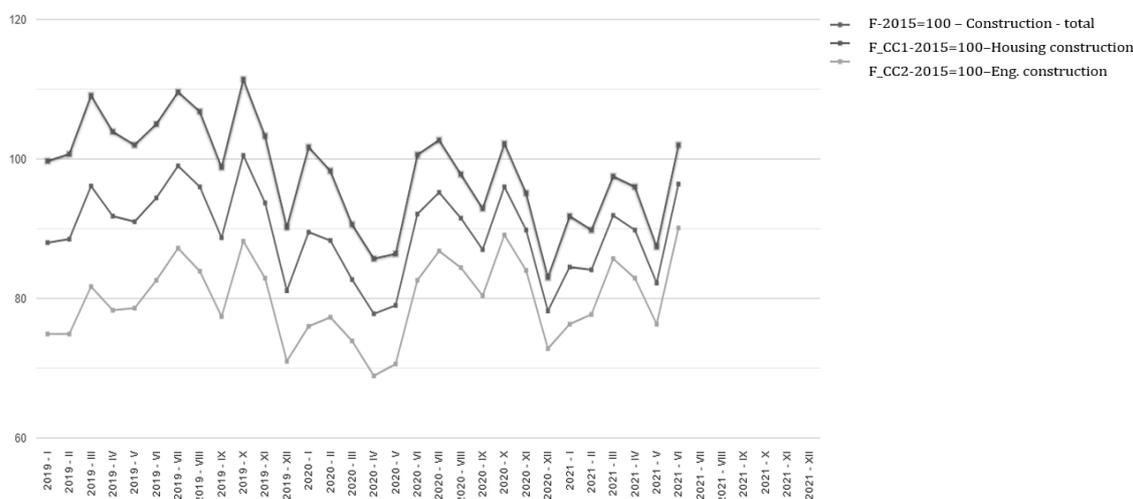*Source: Infostat. 2021.*

Clothing production has been permanently affected, for example with an index of 88,3 in June 2019 it fell to 75 in June 2020 and 73,5 in June 2021. This negative trend can easily be explained by the reduced demand for clothing in the conditions of severely limited mobility and social activity of the population both in Bulgaria and around the world under pandemic conditions. The production of medicinal products and substances is at the other pole, with the production index reporting high values of over 130 in March, April and November 2020, and March 2021 (Infostat, 2021). These values correspond to the three waves of COVID-19 in Bulgaria, which have been observed so far.

Despite the strong economic performance in 2019, **employment** in the **Industry** sector has shown a trend of gradual decline since the beginning of the pre-pandemic year. From 574 477 persons employed in the first quarter of 2019, they reached 557 697 in the fourth quarter, with a sharp decline at the start of the pandemic in the second quarter of 2020, when 535 856 persons employed were reported. We can talk about recovery only in 2021, when for the first quarter the first for the period growth of 544 255 persons employed was reported (Infostat, 2021).

The **Trade** sector, although more moderately than Industry, also contributed to the economic growth prior to the crisis. After the initial lockdown in March and April 2020, similarly to international trade, the sector began to recover in the third quarter of 2020. It is noteworthy that companies and consumers were adapting relatively quickly to the new conditions and were largely switching to online forms of trading, which helped the rapid recovery of the sector as a whole. Until the end of 2020 the tendency of wholesale in non-food consumer goods to move around and above pre-pandemic levels remained. **Employment** in the sector was stable in 2019, showing over 390 thousand persons employed every quarter. However, the decline began already in the first quarter of 2020, when the number of persons employed was 389 thousand, compared to 396 thousand in the last quarter of 2019. In the next second quarter, which generally affected the economy most strongly, there was a smaller decrease by less than 3 thousand persons employed. Employment remained below 390 thousand in the next quarters until the first quarter of 2021 inclusive (Infostat, 2021).

The **Construction** sector, like the Trade sector, is rapidly recovering after the initial shock. Construction is one of the sectors with a smaller contribution to growth in 2019. Fluctuations in housing construction and civil/ engineering construction are symmetrical, as all three more serious declines coincide with the three waves of coronavirus in 2020 and the spring of 2021 **(Fig. 9)**. It is noteworthy that the levels of housing construction, despite the growth of housing prices, are still below those of 2019, in contrast to civil/ engineering construction, which has a tendency to growth even above the levels of 2019. **Employment** in the Construction sector, similar to the Trade sector, also began to decline in the first quarter of 2020, when nearly 124 thousand persons

employed were reported, compared to over 128 thousand persons employed in the first and last quarter of 2019. Employment in the sector has recovered to the pre-pandemic levels of 128 thousand persons employed only in the first quarter of 2021 (Infostat, 2021).

**Figure 9.** Construction production. Calendar adjusted data.
Source: Infostat, 2021.

The **Transport** sector also contributed moderately to the economic growth in pre-pandemic year of 2019. All modes of transport were affected in the first months of the pandemic, falling in the second quarter of 2020. Land transport can be said to have recovered, as its index for the first quarter of 2021 is even slightly higher than that for the first quarter of 2019 - 122.7 compared to 121.2. Air transport is, however, still severely affected, including at an international level. The collapse is most noticeable in the third quarter of 2020, when the index is 56,5 compared to 229,2 for the third quarter of 2019. The first quarter of 2021 has an index of 37.1 compared to 49.4 for the first quarter of 2019; the decline seems less pronounced, but this is not a vacation period of the year. **Employment** in the **Transport** sector decreased by about 3000 people in the second quarter of 2020, recovering to the pre-pandemic levels of over 140 thousand persons employed in the first quarter of 2021 (Infostat, 2021).

Sector **Services**, excluding transport, hotels and restaurants: At the start of the pandemic not a small part of the activities for service provision were limited. However, some activities remained unaffected and others even managed to increase their production. **Postal and Courier** activities have been showing almost a continuous growth since the beginning of the pandemic, including in the second quarter of 2020 until the first quarter of 2021, when the index reached 174.8, with an index of 128.0 for the first quarter of 2019. The same can also be said for telecommunications, which reported a decline in the index only in the first quarter of 2021. Information technologies can also be said not to have been affected by the pandemic; for information technologies, even no conclusion can be drawn for a significant impact of the pandemic in any direction. Security activities are marking a slight increase, which is typical for the sector during crises. Catastrophic is the situation with travel agency activity; it is indicative that the index is 7,8 for the second quarter of 2020, which will probably remain in history as the historically lowest value of a production index in Bulgaria. For the same quarter of 2019 the index is 141.9. **Employment** in sector **Services** has been developing dynamically since 2019. In the second quarter it reached its highest value of 561 162 persons employed; since then it has started to fall steadily, reaching 506 954 during the highly crisis second quarter of 2020. In the following months, the fluctuations are

various, as we can talk about signs of the beginning of recovery only in the first quarter of 2021, when the persons employed exceed 510 thousand (Infostat, 2021).

Sector **Hotel and Restaurant Business**: In general, tourism is the most affected sector by the pandemic. Only for January - May 2020, compared to the same period of 2019, tourist travel in Eastern Europe marked a decline by 54%. Immediately after the introduction of the state of emergency in Bulgaria, the sector collapsed and is still very far from its normal levels **(Fig. 10)**.
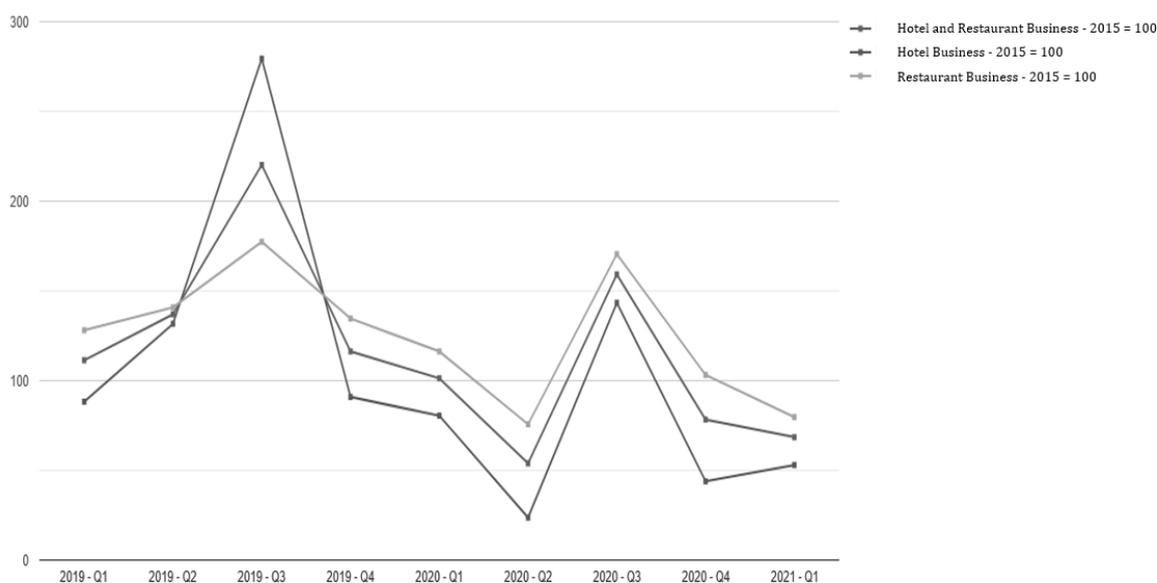
Figure 10. Turnover indices in sector Hotel and Restaurant Business at current prices. Calendar adjusted data.

Source: Infostat, 2021.

In the Hotel Business, the negative dynamics is more pronounced. For the strongest third quarter of 2020 the index is 143.4, compared to 279.4 for the same quarter of 2019. For restaurants, restrictions were lifted several times and reintroduced, which put the sector in great uncertainty, as some of the restaurants closed permanently. It is noteworthy that for the strongest third quarter of 2020 the index of the Restaurant Business reached 170.5, almost equal to that for the same quarter of 2019 (177.4). For the other periods, however, the decline is significantly larger; it reached 79.7 for the first quarter of 2021, compared to 128.1 for the first quarter of 2019. **Employment** in the sector is characterized by high seasonal dependence, which is also observed from the data for 2019, which range from 107 thousand in the winter months from the beginning of the year to over 137 thousand in the summer season; the trend of crisis decline can already be seen in the last quarter of 2019, when employment fell to 103 thousand, and in the first quarter of 2020 to 82 thousand. Surprisingly, the second quarter of 2020 reported an increase to nearly 89 thousand persons employed, which can probably be explained by the beginning of the summer season in June, when the COVID-19 cases decreased. However, the negative trends in the severely affected sector continued to be observed until the end of 2020 – there were 77 thousand persons employed in the last quarter, and 2021 began its first quarter with only 80 thousand, compared to 107 thousand for the first quarter of 2019 (Infostat, 2021).

Sector **IT and Telecommunications** is traditionally among the strongly performing ones in Bulgaria. In 2018, it had a strong contribution to the economic growth of the country. The whole year of 2019 also elapsed in growth of the sector - from an index of 138.6 in the first quarter it reached 187.0 in the fourth quarter. In 2020, the sector started with an index of 151,2 in the first quarter and 150.5 in the second quarter, after which the index increased to 187.8 in the last

quarter. The new year of 2021 started with an index of 175.1 in the first quarter, compared to 138.6 and 151.2 for the same quarter of 2019 and 2020, respectively. As a whole, the sector has not been affected by the pandemic; even it can be said that it has been promoted by the fact that the increase in remote forms of work have lead to an increase in the demand for IT products. This is also confirmed by the dynamics of **employment** in the sector, in which the trend of growth of the persons employed in 2019 continued in 2020, except for the second quarter, in which there was a slight decline by about a thousand people. The year of 2021 started strongly, with 105 917 persons employed in the first quarter, compared to 98 821 and 90343 for the same quarter of 2020 and 2019, respectively.

VULNERABILITY ASSESSMENT OF NON-FINANCIAL SECTORS IN BULGARIA UNDER PANDEMIC CONDITIONS

In general, it can be argued that from the beginning of 2021 economic recovery is under way, but uncertainty remains high. From **chapter** 1 in the present study and on the basis of **Fig. 3** (Social distancing), we concluded that social distancing should be maintained in the coming months in order to limit the spread of constantly mutating COVID-19. The unique thing in this situation is that the human factor vulnerability is at the basis of economic difficulties. Sectors in the economy, where living workforce is dominant and direct contact between a serving party and a served party is required, are more affected (national and international tourism, transport, healthcare, culture, sports). Other sectors manage to readjust quickly and do not experience significant problems (part of the services, administration, education). Some activities and productions will benefit (pharmacy, IT sector, trade in goods of first necessity, production of protective clothing and protective equipment) (Yotsov, Zlatinov & others, 2020). For the management of the economy, it is important not only to assess the most affected sectors in Bulgaria, but also to identify the most vulnerable sectors to lockdowns (restrictions related to social distancing) in general. If the support policies are not precisely targeted by sectors, we take the risk of creating inflation instead of supporting those that are in real need.

To this end, we have developed a compilation method for assessing sectors. In it, each sector is assessed according to 8 criteria:

- Decline in production indices – number of quarters compared to the previous one, starting from the first quarter of 2020 and reaching to the first quarter of 2021. This indicator will show us how many quarters of the crisis period the companies in the sector have been vulnerable to closure.

- Decline in employment – number of quarters compared to the previous one, from the first quarter of 2020 to the first quarter of 2021 inclusive. This indicator will show us how many quarters of the crisis period the persons employed in the sector have been vulnerable to closure.

- Sectoral vulnerability to automation. We explained above (**Fig. 6**) that the shock of COVID-19 accelerates the reduction of employment in sectors and occupations that are more vulnerable to automation. These sectors will, therefore, need stronger employment protection during the pandemic in order to limit the employment rate.

- Percentage of self-employed in the sectors. We explained above that the greater vulnerability of some sectors can be characterized by the percentage of self-employed in the sector. Self-employed in an economy are very often not insured at all or are insured at a minimum income and, accordingly, cannot benefit from business and employment preservation programs.

- Lockdown index.

- Home-office index.

- Teamwork.

- Customer-facing.

The last four indices will be discussed in the text below.

We have already discussed in **chapter 1** that, in order to respond to the spread of the COVID-19 pandemic, governments are implementing lockdown policies aimed at creating physical distance between people. These policies largely affect the workplace. Many activities are closed or their capacity is seriously limited during the peaks of the pandemic. Some jobs are more affected than others, in part because, by their nature, they cannot avoid physical closeness between people in the work process. In addition, some major activities are excluded from lockdown policy due to their crucial importance, such as healthcare, social care and public administration, and they remain unrestricted. There is a strong heterogeneity in the lockdown of different industries. These differences are captured in an indicator called **Lockdown index**. According to a study conducted in Switzerland, large industries, such as the hotel business, construction and education, are most affected by the lockdown. More than 56% of their workers and employees are limited by the lockdowns. In contrast, agriculture, financial services, IT sector and communications are relatively unaffected, with less than 23% of the workers having to work close to other people (Faber & others, 2020).

The **Home-Office index (work-from-home index)** accounts for the proportion of workers and employees in a profession who can work from home. The calculation is based on a number of characteristics - from the area of work, through the socio-demographic characteristics and whether a profession requires daily outdoor work, use of vehicles, mechanical devices or equipment. If so, such professions are classified as unsuitable for home office **(work from home)**. The resulting indicator is defined as a **Home-Office index**, varying between 0 and 1, with 1 meaning that all workers in this group can work from home (Dingel & Neiman, 2020).

In social distancing interventions, the businesses that rely heavily on face-to-face communication where everyone is in direct contact with each other are particularly vulnerable. Data on the dependence of the American business on human interaction show that before the advent of the pandemic 43 million employees worked in professions that relied heavily on face-to-face communication or required physical closeness. Many of these employees lost their jobs in the conditions of COVID-19. Indices measuring how intense the communication is in a job can help quantify the economic costs of social distancing. Such indices are **Teamwork** for measuring internal communication with colleagues and **Customer-facing** for measuring external communication with customers. In order to be accounted for in the indices, face-to-face communication is required to occur at least several times a week, because face-to-face meetings can often be replaced by remote communication. The professions that work intensively in a team or with customers, where both e-mails and other electronic forms of communication are rarer, are included. (Koren & Pető, 2020).

The **Teamwork index** takes into account:
- Face-to-face discussions at least several times a week and predominantly before the use of emails and other remote forms.
- Teamwork.
- Provision of consultations and advice to colleagues.
- Coordinating the work and activity of employees.
- Management, guidance and motivation of subordinates.
- Team development and building.

The **Customer-facing** index takes into account:
- Face-to-face discussions at least several times a week and predominantly before the use of emails and other remote forms.

- Working with external customers.

- Performing for or working directly with the public.

- Helping and servicing customers (patients).

- Providing consultations and advice to customers.

- Establishing and maintaining interpersonal relations.

Usually, the retail and accommodation and catering services, the arts, entertainment and recreation have the highest share of employees with intensive communication, exceeding 35%. The IT, transport, scientific and technical services, as well as the agricultural industry are less dependent on face-to-face communication (Koren & Pető, 2020).

Table 1 shows the results of the assessment of the main non-financial sectors according to the above 8 criteria. The **IT and Telecommunications** sector is the least vulnerable sector by the pandemic, with the least (totally four) quarters of decline in production and employment. The sector is not assessed with a risk of automation and has the lowest percentage of self-employed. Relatively low is also the Lockdown index, which in turn means a low sensitivity to the permanent restrictions on economic life imposed by governments. Finally, the sector is characterized by the highest Home-Office index, which means that it is highly adaptable to the conditions of social isolation.

Table 1. Sectoral Vulnerability Assessment

Sectors\Indicators	Decline in production, number of quarters	Decline in employment, number of quarters	Vulnerability to automation[3]	Self-employed (%)	Lockdown index[1]	Home-office index[2]	Teamwork (%) [4]	Customer – facing (%) [4]
Industry	3	4	1	7,37	0,27-0,47	0,17-0,45	7	5
Trade	3	4	1	22,19	0,08-0,37	0,24-0,60	08-13	12-66
Construction	4	2	1	19,73	0,56	0,16		
Transport	3	2	0	22,19	0,36	0,40	8	8
Services	2	3	0	29,89	0,35-0,53	0,18-0,46	5-12	10-30
Hotel and Restaurant Business	4	2	0	22,19	0,60	0,11	8	50
IT and Telecommunic.	3	1	0	5,92	0,23	0,77		

*Sources: *[1]Faber & others. 2020; *[2] Dingel & Neiman, 2020; *[3] World Economic Outlook, 2021; *[4]Koren & Pető, 2020; Infostat, 2021, and own calculations.*

The **Hotel and Restaurant Business** sector is at the other pole**.** In the sector, there are totally six quarters of decline in production and employment. There is no risk of automation, but there is a relatively high percentage of self-employed. This sector is traditionally characterized by the lowest average income in the economy, which a consequence of the large-scale formal conclusion of part-time and minimum wage employment contracts with workers. In this regard, the sector is particularly vulnerable. It is also rated with the highest **Lockdown index** and the lowest **Home-Office index**. 8% of those working in the sector are exposed to intensive communication with

colleagues and as much as 50% to intensive communication with customers, the latter being one of the highest values among the industries.

The **Services** and **Transport** sectors have similar vulnerability characteristics - a moderate total number of quarters of decline in production and employment – five quarters each, not a small percentage of self-employed – between 20-30%, average **Lockdown index** and **Home-office index** – between 0.35 and 0.53 and between 0.18 and 0.40, respectively. The **Teamwork** index and **Customer-facing** index also have average values – between 5 and 12% and between 8 and 30%, respectively. For the **Services** sector, these variations in the indicators are accounted for due to the heterogeneity of the sector. In general, both sectors can be classified as moderately vulnerable. This assessment is also valid for the **Trade** sector. What is special about it is that there are relatively more quarters of decline in production and employment - as many as seven. There is also a risk of automation and a relatively high percentage of self-employed - 22.19. On the other hand, some types of trade are characterized by a low Lockdown index (0.08) and a high Home-office index (0.60). Online trading is characterized by such signs, which has intensified especially since the beginning of the pandemic. There are also serious differences between wholesale and retail. For example, in wholesale the intensive communication with customers is rated at 12%, while in retail it is as high as 66%.

The **Industry** and **Construction** sectors each also have seven quarters of decline in production and employment. The sectors are also characterized by a risk of automation. In the **Construction** sector, there is a large percentage of self-employed (19.73), a high Lockdown index (0.56) and a very poor opportunity to work from home. It can be concluded that all data point to a high vulnerability of the sector to the pandemic-related restrictions, but such vulnerability does not seem to be socially significant; it is probably compensated to some extent by the strong rise in prices and demand for housing since the beginning of 2021, as well as by the traditional workforce deficit in the sector. In the **Industry** sector, the percentage of self-employed is the lowest after that in the IT and Telecommunications sector - only 7.37%. Heterogeneity in the sector determines the variations in the Lockdown index (0.27-0.47) and Home-office index (0.17-0.45), as within these limits no conclusion of particularly high vulnerability can be drawn. The indicators for the intensity of communication in a team and with customers are also not very high - 7% and 5%, respectively.

CONCLUSION

The analysis of the development of the pandemic in Bulgaria from a medical point of view leads to the conclusion that the health factor for the crisis will not be overcome soon. The mutations of the virus and the fluctuating rates of vaccination in Bulgaria are likely to put the country in need of periodic lockdowns (restrictions) of some economic sectors for at least a few more years. A typical situation for pandemics is for governments and society as a whole to face the dilemma of choosing between the health and well-being of the population.

In order to mitigate the effects of restrictions on social contacts, mobility and part of the economic activity, the Government of Bulgaria has introduced fiscal stimulus measures amounting to about 6% of the Gross Domestic Product. These measures mitigate the shock effect of the pandemic by limiting the loss of jobs, easing the financial conditions for the most affected companies and households, and strengthening healthcare. The measure 60/40 for employment support is specifically targeted at the effects of the crisis. The state pays 60% of the costs for salaries and social security of workers in enterprises with reduced activity. According to data of the National Social Security Institute (NSSI), from the beginning of the pandemic until August 2020 more than 170 thousand, and by January 2021 more than 265 thousand employees to nearly 12,000 employers, were included in it. Most of the supported enterprises are in the **Manufacturing** and **Hotels and Restaurants Business** sectors.

It is particularly important to identify the most vulnerable to the pandemic sectors to provide more targeted and regular support, commensurate with the available relief budgets and anti-inflationary policies. Based on the net government debt for 2020 (difference between gross debt and fiscal reserve), the cost of the crisis for public finance can be assessed. From the beginning to the end of 2020, the net debt increased by over BGN 5.5 billion (Chobanov & others, 2020). All these funds would be in vain, if they lead to an acceleration of the inflation (for now forecasts for 2021 are for an inflation of over 3%), without supporting the most affected and vulnerable sectors of the economy. In the present study, we have found that the most vulnerable sector in Bulgaria is the **Hotel and Restaurant Business** sector. The negative consequences in it are expected to persist in long term. This sector is traditionally characterized by a relatively high share of self-employment and seasonality, as well the lowest average income in the economy, which is a consequence of the large-scale grey sector practices such as: formal conclusion of part-time and minimum wage employment contracts with workers. For these reasons, government support in this sector is difficult. The fact that under the 60/40 program the state pays 60% of the costs for salaries and social security of employees in enterprises with reduced activity will not help much in the Hotel and Restaurant Business sector. At the same time, this sector is fundamental for employment and sustainable economic growth of Bulgaria. In these hard times, it needs specifically targeted strengthening. **Air transport** remains directly related to tourism and seriously affected.

The possible range of specifically designed government supported measures for strengthening of sectors Hotel and Restaurant Business and Air transport can be explored in a further study. It is most certain that they can only be saved by gradually easing the international travel restrictions. The right step in this direction are vaccination passports (certificates), but in order to validate their use and for people to start returning to the pre-pandemic levels of mobility, more decisive action will be needed at European Union level. It is necessary to adopt the same (unified) requirements for issuing certificates and rules for mobility between countries. In this way, certificate holders will be able to return to a more normal life and mobility.

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APPENDIX

Table. Dynamics of employment in non-financial sectors and Stringency index for Bulgaria

Quarters	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021
Industry	557697	553860	535856	535485	534606	544255
Construction	128096	123772	125336	125272	124985	128443
Trade	396317	389231	386459	385707	387187	383564
Services	520018	509842	506954	509850	494949	510436
Transport	138911	140073	136979	137076	136108	140387
Hotel and Restaurant Business	102684	81864	88891	89664	76904	80355
IT and Telecommunications	93480	98821	97386	99031	99765	105917
Stringency index	0	18,98	57,69	37,91	46,78	54,34