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EVALUATION OF THE ANTIVIRUS A PROGRAMME IN THE CZECH REPUBLIC DURING THE COVID-19 PANDEMIC

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Abstract:

This paper analyses an employment support programme - the Antivirus A Programme - implemented in the Czech Republic during the COVID-19 pandemic, aimed at maintaining a constant level of employment. We present this government programme in detail, including individual data related to its effectiveness, and examine similar employment support programmes in other EU countries during the pandemic. We also analyse the economic development of sectors that received employment support. The main contribution of the paper is the creation of a counterfactual scenario of the unemployment and inflation rates in the Czech Republic in the absence of the Antivirus A Programme, using a short-run Phillips curve concept. According to Bajgar et al. (2021), one third of Czech workers could work from home during the pandemic. We find that if these workers had not been supported by the Antivirus A Programme, Czech taxpayers could have saved EUR 0.15 billion, and the inflation rate could have been reduced (based on our short-run Phillips curve model) by 0.66-0.99 p.p. for the entire duration of the Antivirus A Programme, depending on the choice of assumptions related to the possibility of working from home.

Keywords:

Antivirus A Programme, COVID-19 pandemic, unemployment, fiscal policy, government intervention, short-run Phillips curve

JEL Classification: E24, E65, J33

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Introduction

Since the outbreak of COVID-19 pandemic, numerous economics papers on the pandemic and its economic and social impacts have been published. One field aims to evaluate the various government support programmes implemented during the COVID-19 pandemic. As a supply shock, the pandemic potentially may have led to a long-lasting economic downturn initiating an economic cycle (Cermakova and Hromada, 2022). Government support was targeted (among other things) to protect the employment level. Employment was threatened due to a decline in aggregate demand, production constraints (lockdowns) and due to quarantines and isolation. Therefore, countries all around the world launched various programmes to help employers retain their staff. Now, in hindsight, it is possible to evaluate the effectiveness of these programmes.

So far, economic research rates individual employment support programmes applied abroad rather positively. According to Bhutta et al. (2020), the US Congress approved government support called Coronavirus Aid, Relief, and Economic Security (CARES). This programme helped nearly half of the US citizens harmed by COVID-19 related restrictions to pay their recurring expenditures in the event of long-term unemployment. This phenomenon was caused by low household financial reserves and low standard of unemployment support. Merikuell and Paulus (2023) evaluated the job retention support provided in Estonia during the COVID-19 pandemic and concluded that the support had a positive effect on employment. According to their results, one job in five was saved and the unemployment rate would have been higher by 2-4 percentage points (p.p.) in 2020. On the other hand, Cook and Grimshaw (2021) point out that short-time working programmes in Germany, Italy, Norway, and the UK left women vulnerable to economic risks since the employment support programmes were designed using assumptions of a normative (male) worker.

Zubikova and Smolak (2022), among others, analyse the employment level in the Czech Republic (CR) during the COVID-19 pandemic. They found that nominal wages in both the public and private sectors grew more than the aggregate labour productivity in the CR. Zubikova and Smolak (2022) identify this, along with the excessively loose fiscal policy, as one of the causes of the high inflation in the CR. They also note that the restrictive measures taken in response to the COVID-19 pandemic have mainly affected the private sector. The number of hours not worked in the private sector increased by almost 60% in the second quarter of 2020 when the COVID-19 pandemic began. They further confirm that unemployment and inflation exhibited the behaviour described by the Phillips curve (PC) during the COVID-19 pandemic.

Jurajda, Dolezelova and Zapletalova (2021) examine employment support provided in the CR, focusing on the Antivirus B Programme. In total, 315 employees received this form of support in the second quarter of 2020. They find that the manufacturing industry has benefited most from this programme, and they point out low coverage of the fall in hours worked in several sectors provided by the Czech government (administrative and support activities, accommodation, catering and hospitality, cultural, entertainment and recreational activities).

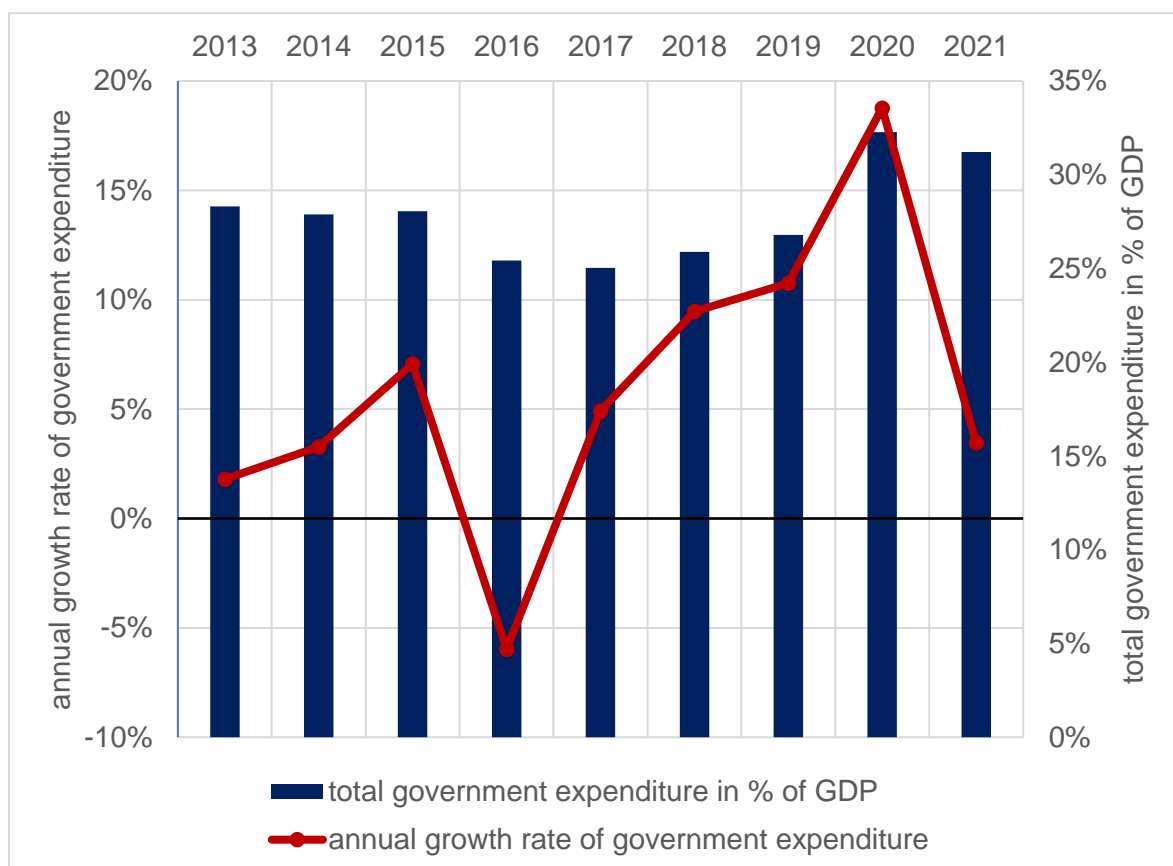
In this paper, our analysis of the Antivirus A Programme complements existing research on fiscal support programmes introduced during the COVID-19 pandemic aimed at maintaining employment. The paper is structured as follows. Section 1 briefly analyses public finance development in the CR during the COVID-19 pandemic. Section 2 provides the general overview of the whole Antivirus Programme, including a comparison with similar programmes

in other European countries. Section 3 focuses on economic development in sectors subsidised by the Antivirus A Programme. Section 4 presents the results of our evaluation of the Antivirus A Programme and provides an estimation of the short-run Phillips curve in the CR in the absence of the Antivirus A Programme. Finally, Section 5 discusses the economic and political implications of the Antivirus A Programme.

1. Development of Public Finance in the CR During the COVID-19 Pandemic

Between 2013 and 2019, the annual average growth rate of the total public budget expenditure was 5.59% and its average size was over 1,3 trillion Czech crowns (CZK) (EUR 55.2 billion¹). In 2020, the year in which the COVID-19 pandemic broke out in the CR, total expenditure increased by an unprecedented 18.77% from CZK over 1,5 trillion to CZK over 1,8 trillion (EUR 65.64 billion to EUR 77.96 billion) compared to 2019 (Ministry of Finance of the CR [MF CR], 2022a; own calculations). Moreover, public expenditure continued to grow in 2021 and 2022. The increase in the expenditure of the public budget was also reflected in the development of its ratio to Gross Domestic Product (GDP), which rose from 26.79% in 2019 to 32.28% in 2020. The development of the expenditure of the public budget is illustrated in the following chart.

Figure 1 Trend of total government expenditure in % of GDP and its growth rate in the Czech Republic between 2013 and 2021



Source: own elaboration based on MF CR (2022a, str. 13); Czech Statistical Office (CSO) (2022a); own calculations

¹ At the Czech National Bank exchange rate as of 25 February 2023, 2:30 p. m. – this exchange rate is used for all CZK to EUR currency conversions.

Figure 1 shows that the fastest growth rate of public spending compared to the previous year was achieved in 2020 and the growth rate already declined in 2021. However, this is due to the very high comparative base of the previous period. Although the original budget plan for 2020 was calculated with an approved deficit of CZK 40 billion (EUR 1.69 billion), due to the situation surrounding the COVID-19 pandemic, three amendments to the Budget Act were approved during 2020, and the budget eventually reached a record deficit of CZK 500 billion (EUR 21.15 billion). Except for the reduction in defence spending (CZK 1.5 billion, EUR 0.06 billion), none of the amendments to the State Budget Act proposed any savings. The number of employees in the government-regulated sector also increased significantly in 2020 (Supreme Audit Office [SAO], 2021, p. 21–27).

To a large extent, the increase in public spending also determines the increase in the deficit of the public budget. In the years of the COVID-19 pandemic, the budget deficit exceeded the Maastricht convergence criterion for public finances, according to which the budget deficit must not exceed 3% of GDP. In 2020, this deficit reached 6.44% of GDP, and in 2021 it rose to 6.87% of GDP (CSO, 2022a). The structural deficit relative to GDP also widened considerably in the pandemic years, with a deficit of 2.6% of GDP in 2020 and 4.1% of GDP in 2021 (MF CR, 2022a). According to the so-called Fiscal Compact, this deficit should not exceed 1% of GDP (for countries with a government debt ratio well below 60% of GDP, [ECB, 2017]). Thus, the development of the public budget and its structure during the COVID-19 pandemic can be described as highly risky in terms of the long-term sustainability of public finances. In the worst-case scenario, the Czech economy could enter an adverse growth-debt spiral, similar to the Southern European countries (see Bednar, 2018).

The increase in the budget deficit is also linked to an increase in the national debt. Although the CR's debt-to-GDP ratio is significantly lower than the average of the European Union (EU) and Eurozone countries, the growth rate of this ratio in the pandemic years accelerated. In 2020, the ratio rose by 7.6 p. p. compared to the previous year, and by a further 4.2 p. p. in 2021 (Eurostat, 2022), bringing the national debt to 41.9% of GDP (SAO, 2022, str. 25). Moreover, in 2021, the growth rate of this ratio was significantly higher than in EU or Eurozone countries, where the size of national debt relative to GDP was decreasing (Eurostat, 2022). Therefore, the growth rate of national debt to GDP can also be considered risky from the point of view of the sustainability of public finances². On the other hand, the structure of national debt carries relatively low risks. Indeed, the share of external debt in total state debt declined steadily from 2014 to 2021 (MF CR, 2022b). The share of non-negotiable debt also declined until 2020. In terms of the share of non-tradable debt, 2021 was a cautionary year in which the share of non-tradable debt increased, but the level of this share is still considered a relatively low risk compared to its size in other EU countries. The share of Treasury bills in marketable debt has also been very low over the long term (MF CR, 2022c). Overall, the structure of government debt does not imply any major threats to the sustainability of public finances.

The increase in public expenditure is related to a package of several fiscal measures introduced by the Czech Government during 2020 and 2021 to mitigate the negative impacts of COVID-19 pandemic and restrictive measures related with it. The fiscal measures can be divided into 4 groups, following the example of the European Commission (2020). These groups are subsidy measures, tax measures, public guarantee measures, and other

² Bednar and Bechny (2020) have pointed out that the CR suffers from significant structural disparities in synchronization with the eurozone at high frequencies.

measures. The Antivirus A Programme, which is the subject of this paper, is classified as a subsidy measure. Together with the Antivirus Programme, the subsidy group also includes, for example, a compensation bonus for small companies and self-employed workers, a subsidy called Programme Provoz 2020, the COVID-rental Programme, and the COVID-non-covered Costs Programme (European Commission, 2020).

2. General information about the Antivirus Programme

The Antivirus Programme, which was approved by the Czech government on 31 March 2020 by Government Resolution 353/2020, was an employment support programme that aimed to compensate companies for economic difficulties caused by the COVID-19 pandemic (Nesleha, 2020). The programme was modified several times by further government resolutions (Ministry of Labour and Social Affairs of the CR [MLSA], 2021b, str. 4). The purpose of the programme was to partially compensate for lost wage remuneration to employees in the event of quarantine and in the event of work obstruction due to the implementation of restrictions (Government of the CR, 2020).

The main objective of the programme was to mitigate the risk of employee layoffs due to business restrictions caused by the COVID-19 pandemic. For the years 2020 and 2021, CZK 49.5 billion (EUR 2.09 billion) was paid out under the Antivirus Programme, supporting over 70,000 companies and over one million employees (SAO, 2021, p. 19; MLSA, 2020d). Of the total amount paid out, approximately 5% was covered by the Employment Programme, which was funded by the EU.

- On average, over four monthly wages were paid per one worker;
- the programme helped more than one in three private sector workers and one in four companies that pay social and health insurance for their workers;
- almost 90% of the companies that used the Antivirus Programme had fewer than 25 employees;
- the support was mainly targeted at small (25%) and micro companies (70%);
- the economic sectors that received relatively the most Antivirus Programme funding were determined by their level of impact, both by the restrictions implemented and by the COVID-19 pandemic itself;
- most of the funds were directed to trade (23%), hospitality and accommodation (20%) and manufacturing (17%);
- the Antivirus Programme was drawn the most in March (over CZK 4 billion – EUR 0.17 billion) and especially in April 2020 (almost CZK 7 billion – EUR 0.3 billion);
- in the following months up to September 2020, spending on overall Antivirus Programme support declined with the severity of the restrictions imposed;
- between October 2020 and April 2021, the intensity of the restrictions increased again, and with it, spending under the Antivirus Programme increased slightly, ranging between CZK 3 and 4 billion (EUR 0.13 and 0.17 billion) during this period;
- in general, the amount of support drawn from the Antivirus Programme was directly proportional to the intensity of the restrictions introduced (MLSA, 2020d).

The Antivirus Programme is divided into four basic programmes - Programme A and Programme B as the original programmes introduced by Government Resolution 353/2020, which were subsequently supplemented by Programme A+ and C (MLSA, 2021a). The purpose of Programme A, which is the main focus in this paper, was to finance 80% (up to a maximum of CZK 39,000 per month per worker – EUR 1,649.75) of wage compensation lost due to quarantine or restricted operations set by the government (MLSA, 2020d). Companies could only apply for support under Programme A if they were forced to close operations by government decree due to the restrictions imposed, while paying their workers wage compensation equal to 100% of their average wage, or if their workers were quarantined and received wage compensation equal to 60% of their average reduced earnings (MLSA, 2021a). Programme A took effect from the outset of the introduction of the Antivirus Programme and was extended in stages until the end of February 2022 (MLSA, 2022a). Programme A was the only part of the Antivirus Programme to be extended only to 31 October 2021. The other Antivirus programmes (B, A+, and C) were extended to 31 May 2021.

The purpose of Programme B was to finance 60% of wage compensation including social and health insurance contributions (maximum CZK 29,000 per month per worker – EUR 1,226.73 in the case of a stoppage in production or a reduction in sales [MLSA, 2020d]). Companies that benefited from Programme B were obliged to pay workers wage compensation at 100% of the employee average wage in the case of obstacles on the employer's side due to the absence of more than 30% of workers resulting from the quarantine order, at 80% of the average wage due to limitations in the availability of raw materials or products, or at 60% of the average wage due to limitations in demand for the company's products (MLSA, 2021a). Programme B took effect from the start of the Antivirus Programme and was gradually extended until the end of 2021 (MLSA, 2022a).

The A+ Programme was launched on 1 October 2020 due to the worsening pandemic situation and the intensification of restrictions introduced with it. The purpose of the A+ Programme was to finance 100% of wage replacement, including social and health insurance contributions (maximum CZK 50,000 per month per worker – EUR 2,115.06) in the event of a significant reduction in the operation of companies. In contrast to Programme A, the A+ Programme covered 100% of the costs per worker and, in total, the highest amount was paid to firms under Programme A+ of all the Antivirus Programmes (MLSA, 2020d). Only accommodation and catering facilities and services and shops closed by the restrictions could benefit from Programme A+. Only companies that had not previously received more than EUR 1.8 million under other COVID-19 programmes could apply for support under the A+ Programme. The eligibility period for support under Programme A+ expired at the end of May 2021 (MLSA, 2021a).

In addition to these three programmes, Programme C was launched in mid-June 2020, which exempted small companies with less than 50 employees from paying social security contributions on behalf of their employees. Only some of small companies were eligible for compensation of non-wage costs for workers. They had to meet two conditions:

- 1) they had to be able to maintain their number of employees; and
- 2) they had to be able to keep the total volume of wages paid.

Both conditions at the minimum level of 90 % of the March 2020's level (MLSA, 2020a).

The Antivirus Programme was not unique in its kind. All EU countries have introduced some form of unemployment support (as have other European countries such as Switzerland and Norway). These programmes have either been directly targeted at job protection (see Table 1) or have been aimed more at general support for the business sector, e.g. in the form of loans. However, the exact conditions for use of the support differ. Table 1 shows selected employment support programmes applied in EU countries. Most of these were wage compensations for hours not worked. The government provided compensation to employers for paying wages to individuals who did not work in order to prevent layoffs. Similarly to the CR, in Slovak Republic, Belgium, France, Italy, and Sweden the aid was linked to previous salary levels. A certain maximum threshold was set, above which support for loss of employment due to the pandemic was no longer paid. This limit was also introduced by Poland, Germany, and Hungary.

Table 1 Selected programmes similar to the Antivirus A Programme in European countries

Country	Name of support	Period	Description	Source
Slovak Republic	Prvá pomoc Slovensku (First Aid to Slovakia), measure 1 and 3A	3/2020-2/2022	Support of 80% of gross wages for employers whose activities have been restricted due to COVID-19 pandemic, either officially or due to the economic downturn; for measure 1 maximum amount of EUR 1,100 per worker and for measure 3A for EUR 880 per worker was paid	Ministry of Labour, Social Affairs and Family of the Slovak Republic (MLSAF SR, 2023)
Poland	Lockdown Allowances	4/2020-3 months until the pandemic is over	Lockdown allowances equal to PLN 2,080 (EUR 462) for VAT payers and PLN 1,300 (EUR 289) for self-employed workers exempt from VAT	European Social Policy Network (ESPN, 2021)
Germany	Corona-Bonus	3/2020-6/2021	Extra payment up to EUR 1,500 (tax and social contributions free) by employers for employees who takes care of a person harmed by COVID-19 virus	Addleshaw Goddard (AG, 2021)
Austria	Corona Short-time work	3/2020-3/2021	Compensation for reduced working hours (10-90%) for a planned period, total amount paid EUR 8 billion until March 2021	Federal Ministry Republic of Austria (FMRA, 2021), Tamesberger, Theurl (2021)
Belgium	Corona temporary unemployment regime	2020-9/2021	Temporary benefits to employees who lost their job due to COVID-19 related restrictions, the amount of the temporary unemployment benefit is 70% of the last monthly salary (the salary was capped at EUR 2,754.76) + supplement of EUR 5.63	Ernst & Young (EY, 2021)
France	Decree #2020-323	3/2020-12/2020	If an employment contract is suspended, the employee	KPMG (2020a)

			receives a compensatory indemnity from their employer (maximum of 70% of the prior gross remuneration, can be increased to 100% of the previous net compensation if training is provided)	
Italy	Employment retention/ short-time work	3/2020-12/2020	Compensation for workers during period of temporary or permanent disruption of production (80% of the gross salary and full social security contributions). Granted to enterprises in the manufacturing and building and construction with 15 or more workers for a period that depends on the specific situation (up to 36 months)	International Labour Organisation Office for Italy and San Marino (ILO, 2020)
Sweden	Short-time work allowance	3/2020-12/2020	Compensation more than 90% of the salary (maximum SEK 44,000 – EUR 3,963.6 ³ - per month) for workers with reduced working hours. Government will pay 75% of the cost for the employees reduced work hours	KPMG (2020b)
Hungary	Kurzarbeit with training obligation	5/2020-8/2020	Similar to German Kurzarbeit but with more complex conditions, such as employees must have reduced working hours by 30-50% and in businesses in which orders had not fallen more than 50% and worked towards the “interest of national economy”	Eurofound (2020)

Source: Own review based on the sources listed in the Table 1

Altomonte et al. (2021) states that protection of employment among EU countries during COVID-19 pandemic was achieved. However, according to the structure of programme used in a country, the efficiency of support differed. For example, in Italy and Germany, support was targeted to most productive firms, whereas the French support programme was not related to productivity of supported firms.

Given that the EU considers young people more exposed to the threat of unemployment, the EU supports them more in their search for work at all times. Lambovska et al. (2021) examine unemployment rates during the COVID-19 pandemic for the population under age 25 and show that the largest increases in unemployment rates among youth during the pandemic occurred in countries with consistently low unemployment rates, such as the CR (year-to-year change 2.19 p.p.) and Estonia (year-to-year change 2.5 p.p.).

Agba et al. (2020) point out that the pandemic impacted not only the unemployment rate, but also the work environment. In particular, they find that the pandemic had negative effects on workers' mental health, social relations between employees and also escalated discrimination in the workplace.

³ At the European Central Bank (ECB) exchange rate from January 15, 2023, 12:00

In Slovak Republic, a total amount of EUR over 2.3 billion was paid out under the First Aid Support to Employees, Measures 1 and 3A in the period from March 2020-February 2022. However, in the CR, the Antivirus A Programme support was paid out and data for disbursements are available for the CR only in the period from March 2020-April 2021. As shown in Table 2, in this period, a total amount of EUR over 400 million in aid was paid in the CR, which is 0.187% of Czech GDP in 2021 (our own calculation based on data from Eurostat, 2023 and MLSA, 2021e). In Slovakia in the same period (March 2020-April 2021), a total of EUR over 450 million was paid out, representing 0.461% of Slovak GDP (our own calculation based on data from Eurostat, 2023 and MLSAF SR, 2023). However, Svabova et al. (2021) calculate that the unemployment rate in Slovak Republic during the COVID-19 pandemic was 2-3% higher than its natural development. Additionally, we analyse only one type of the support provided to private sector, so this result does not reflect the total aid granted as a share of GDP.

Table 2 Comparison of support in Czech Republic and Slovak Republic

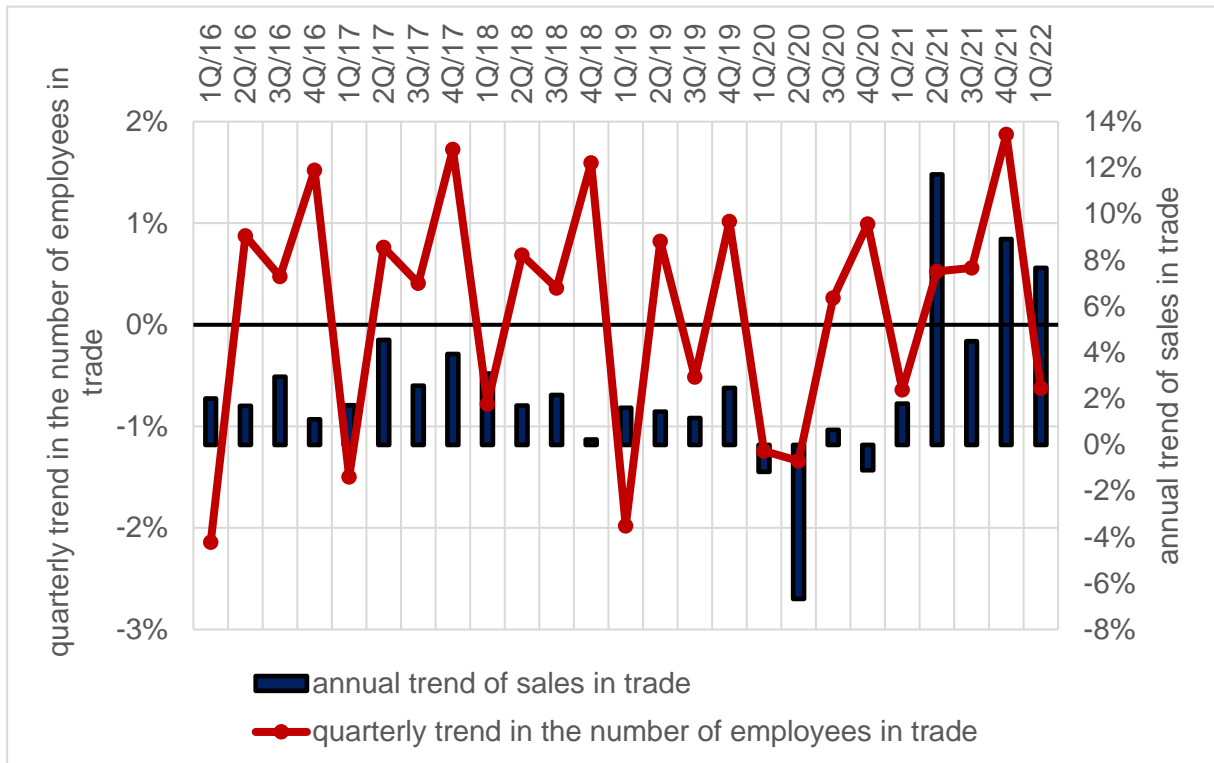
	Total support in March 2020-April 2021 (in national currency)	Total support in March 2020-April 2021 (in million EUR)	GDP 2021 (in million EUR)	Support as a % of 2021 GDP
Czech Republic	10,504,881,416.000	444.370	238,249.500	0.187
Slovak Republic	454,253,519.180	454.254	98,523.000	0.461

Source: Own review based on Eurostat (2023), MLSA (2021e) and MLSAF SR (2023)

3. Economic development in the most subsidized sectors

As mentioned above, most of the Antivirus Programme funding went to the sectors of trade (23%), hospitality and accommodation (20%) or manufacturing (17%), as these sectors were the most affected by the restrictions. This section therefore examines the relationship between the evolution of sales or output and the evolution of the number of workers in these sectors.

Figure 2 Comparison of the development of the number of employees with the development of sales in trade between Q1 2016 and Q1 2022 in the Czech Republic



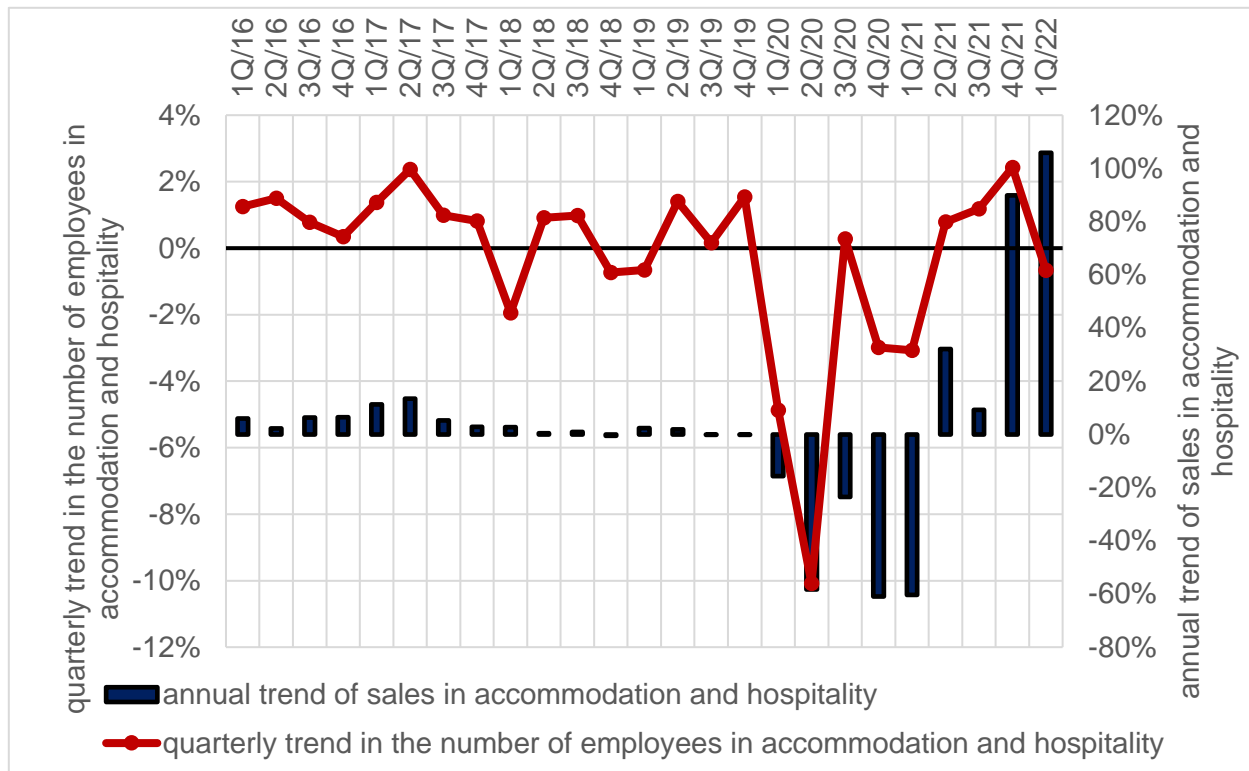
Source: own elaboration based on data from Cerny (2022); CSO (2022b); own calculations⁴

The Q1 and Q2 of 2020, when the COVID-19 pandemic occurred, were the only consecutive quarters in the entire time series that experienced a decline in the number of workers in the trade sector. Between Q3 2020 and Q1 2022, the trade sector experienced only two more declines in the number of workers, in both Q1 2021 and Q1 2022.

In regard to the development of sales in trade, their real amounts grew throughout the time series from the beginning of 2016 until the outbreak of the COVID-19 pandemic in the CR. With the onset of the pandemic, sales in the trade sector fell for the first time in several years, with a significant drop in Q2 in particular, during which very intense restrictions were implemented in the CR. In the last quarter of 2020, when the restrictions were again relatively more intense, sales in the trade sector fell again, in contrast to the growing number of workers employed in this sector. From the second quarter of 2021 to the first quarter of 2022, sales in the trade sector grew significantly year-on-year.

⁴ The evolution of the number of workers in trade is derived from the recalculated average number of workers within a given quarter according to the ILO methodology (Cerny, 2022). The evolution of the number of workers is calculated as the ratio of the total number of workers in the trade in each quarter to the total number of workers in the trade in the previous quarter. The store sales index is derived from the seasonally adjusted store sales development shown, including adjustment for calendar effects. The sales index is calculated here as the ratio of the magnitude of total sales in the trade in a given quarter at constant prices to the magnitude of total sales in the same quarter of the previous year at constant prices. Sales trends included sales in trade, wholesale, retail trade and sales and repairs of motor vehicles (CSO, 2022b).

Figure 3 Comparison of the development of the number of employees with the development of sales in accommodation and hospitality between Q1 2016 and Q1 2022 in the Czech Republic



Source: own elaboration based on data from Cerny (2022); CSO (2022e); own calculations⁵

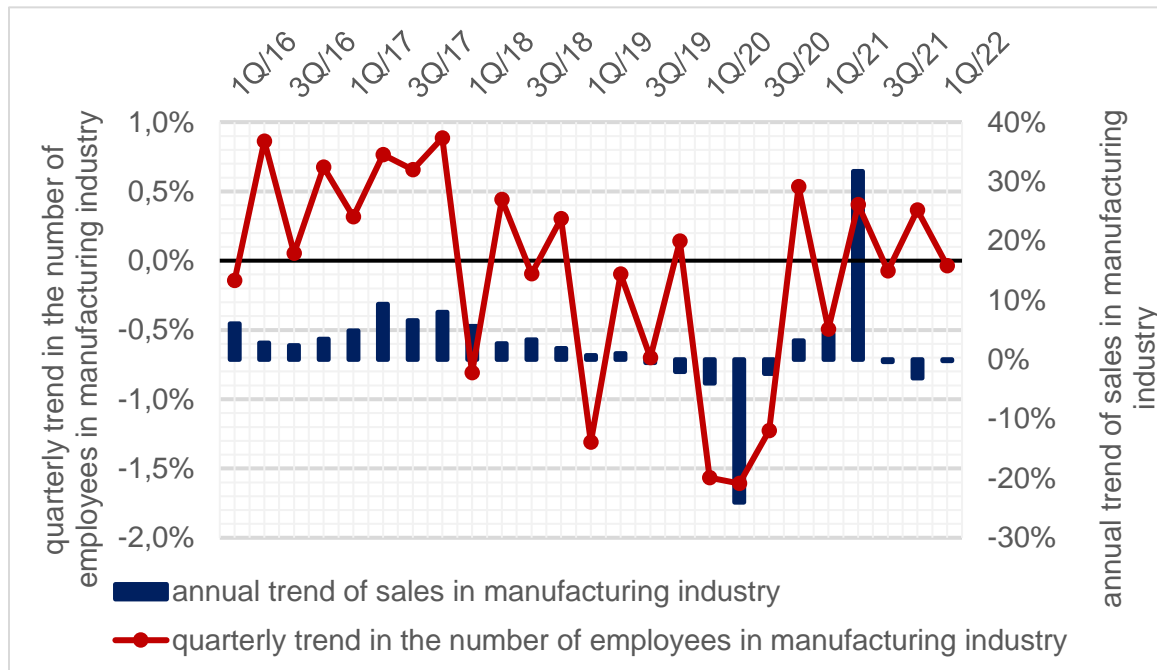
Figure 3 shows that the accommodation and hospitality sector experienced a significantly higher turnover of workers and sales than the retail sector during the COVID-19 pandemic. The turnover of sales and workers in accommodation and hospitality increased significantly with the start of the pandemic. The annual drop in sales during the pandemic was over 60%. While in the period before the pandemic, sales in the accommodation and hospitality sector were rising steadily since the beginning of 2016, during the pandemic period between Q1 2020 and Q1 2021, there were significant year-on-year declines in all five consecutive quarters each time. Conversely, between Q2 2021 and Q1 2022, all four consecutive quarters saw a return to very rapid revenue growth.

In relation to unemployment, the COVID-19 pandemic saw a significant fall in employment, particularly in the first half of 2020, with accommodation and hospitality employment falling by 4.88% quarter-on-quarter in Q1 2020 and by a further 10.08% in Q2 2020. In Q3 2020, accommodation and hospitality employment remained almost unchanged despite the loosening of the restrictions and decreased again in the following two quarters as the intensity of the restrictions increased. Over the next four quarters, employment in the accommodation

⁵ The evolution of the number of workers in the accommodation and hospitality sector is derived here from the recalculated average number of workers within a given quarter according to the ILO methodology (Cerny, 2022). The index of sales in the accommodation and hospitality sector is derived from the seasonally adjusted evolution of sales in the accommodation and hospitality sector shown above, including adjustment for calendar effects. The sales index is calculated here as the ratio of the size of total accommodation and hospitality sales in a given quarter, given in constant prices, to the size of total sales in the same quarter of the previous year, given in constant prices.

and hospitality sector followed a similar pattern to that of trade, with employment rising in Q2, Q3 and Q4 2021, while employment fell again in Q1 2022.

Figure 4 Comparison of the development of the number of employees with the development of sales in manufacturing industry between Q1 2016 and Q1 2022 in the Czech Republic



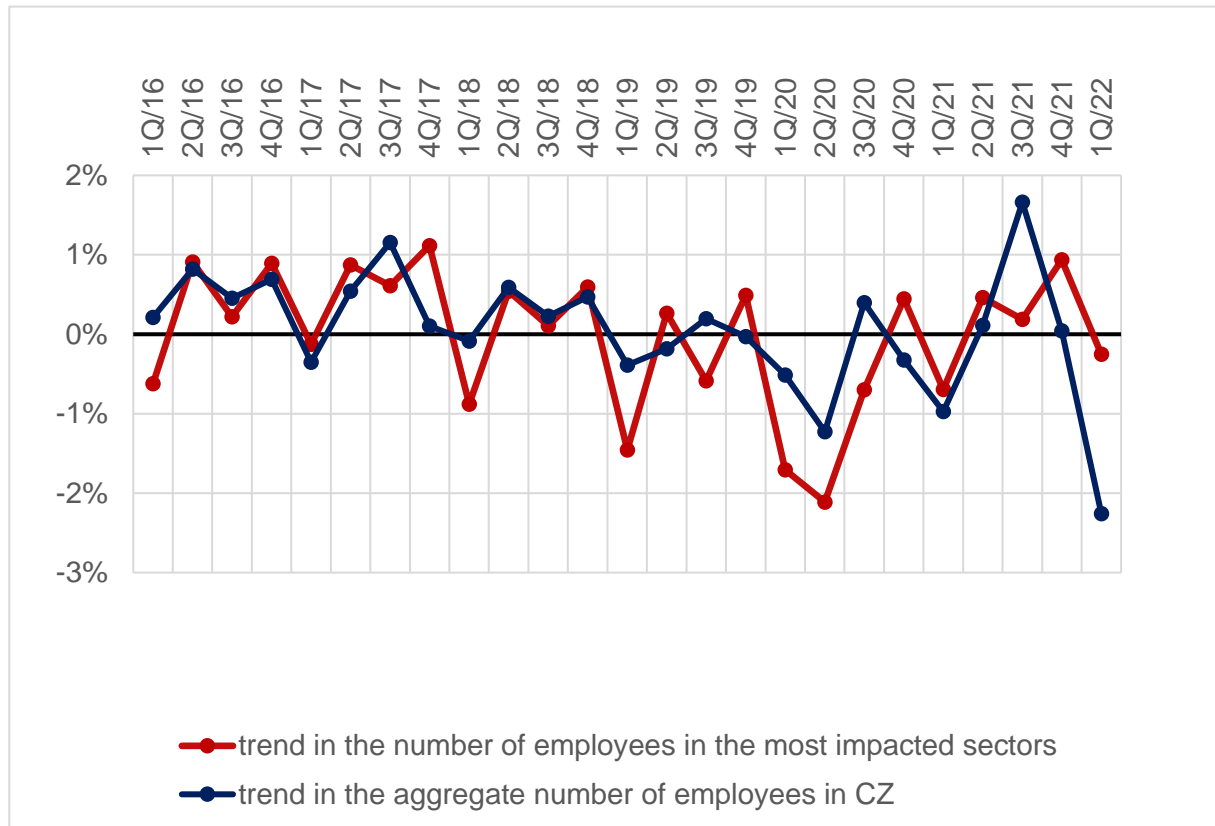
Source: own elaboration based on data from Cerny (2022); CSO (2022d); own calculations⁶

From the beginning of 2016 to the third quarter of 2019, manufacturing, similarly to trade and accommodation and hospitality, grew steadily. Unlike the other two sectors most affected by the restrictions, manufacturing had already been experiencing a slight decline in production before the COVID-19 pandemic occurred in the country. At the time of the outbreak in the CR, the manufacturing industry experienced a sharp decline, particularly in the first half of 2020, with manufacturing falling by less than 2% on an annualized basis in Q1 and by up to 25% in Q2, in which the level of restrictions intensified. The manufacturing industry, which is the backbone of the Czech economy, is the most vulnerable sector in crisis periods as it is structurally not diversified (Kaderabkova and Jasova, 2011). In fact, manufacturing output also fell in Q3 of 2020. Subsequently, between the fourth quarter of 2020 and the second quarter of 2021, manufacturing output increased on an annual basis. Between Q3 2021 and Q1 2022, there was again a slight annualized decline in output, despite of the loosening of restrictions.

With the onset of the COVID-19 pandemic, there was a significant decline in the sector, with the number of workers in manufacturing declining slightly quarter-on-quarter in Q1, Q2, and Q3 2020.

⁶ The evolution of the number of workers in manufacturing is derived here from the recalculated average number of workers within a given quarter according to the ILO methodology (Cerny, 2022).

Figure 5 Comparison of the development of the number of employees in the most impacted sectors with the development of the aggregate number of employees between Q1 2016 and Q1 2022 in the Czech Republic



Source: own elaboration based on data from Cerny (2022), CSO (2022e); own calculations⁷

Figure 5 shows that the number of workers in the sectors that were most affected by the COVID-19 pandemic and also most supported by the Antivirus A Programme evolved in the period before the COVID-19 pandemic appeared in a similar way to the number of workers in the whole economy. At the time of the COVID-19 outbreak in the first three quarters of 2020, the trade (-1.71%), accommodation and hospitality (-2.11%) and manufacturing (-0.7%) sectors experienced a relatively slightly higher fall in employment, but this difference was no more than 1.2 p. p. higher than the overall employment in the country (Q1 2020). Between Q4 2020 and Q1 2022, employment in the most affected sectors grew quarter-on-quarter in four of six quarters, while employment in all sectors grew in only three of six quarters. Moreover, in Q1 2022, the number of workers in the sectors most affected by the pandemic was almost unchanged, despite the most significant quarter-on-quarter decline in workers at the aggregate level since early 2016 (-2.26%).

Overall, given the large fall in sales or output in the most affected sectors and comparing the evolution of the employment rate in these sectors with the aggregate employment rate, we observe that the Antivirus A Programme has indeed helped to mitigate the fall in employment in the most affected sectors, i.e., trade, accommodation and hospitality, and manufacturing.

⁷ The index of manufacturing output is derived here from the evolution of manufacturing output adjusted for calendar effects. The output index is calculated here as the ratio of the size of manufacturing output in a given quarter to the size of output in the same quarter of the previous year (CSO, 2022d).

Other sectors of the economy were, however, also negatively affected by the COVID-19 pandemic. For example, it had a huge impact on the real estate market. As was already said, the pandemic has caused a decline in economic activity and increased unemployment rates, leading to changes in demand for real estate (Hromada et al., 2022). Jasova (2017) shows that a construction sector downturn lasts longer than economic downturns in other sectors. In fact, lack of supply and shocks in demand for properties during the COVID-19 pandemic period led to unprecedented turbulent development in the Czech property market, making housing unaffordability and housing poverty a highly contentious issue for economic policymakers (Cermakova and Hromada, 2022). However, the impact of the pandemic on the real estate market has not been uniform across different regions, and the effects on property prices have varied depending on location and other factors (Hromada, 2021).

4. Antivirus A Programme: Data

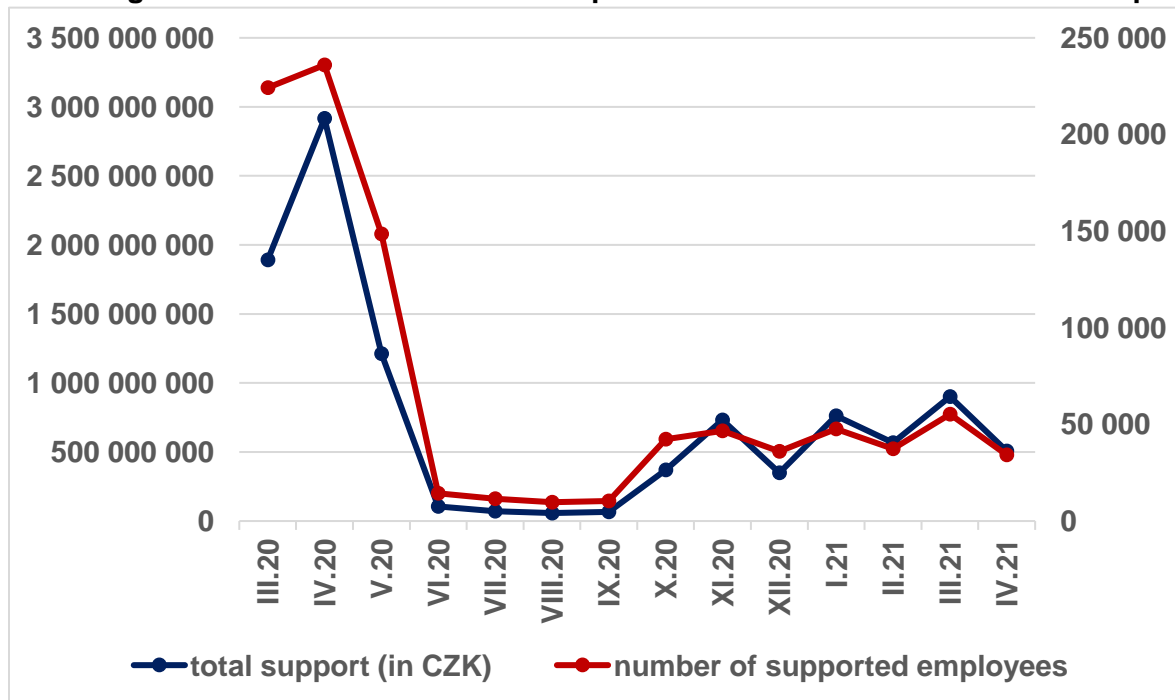
MLSA provides a monthly analysis of employee support under the Antivirus A Programme only up to the end of April 2021⁸.

Figure 6 tracks the evolution of support to employees under the Antivirus A Programme. The MLSA paid the highest support to employees under the Antivirus A Programme in April 2020. From the second quarter of 2020, there was a sharp reduction in the need for employers to help pay wages to employees who were unable to work due to quarantine or isolation. Towards the end of 2020, Antivirus A Programme expenditures increased slightly again.

⁸ Evidence of the lack of monthly data can be found, e.g., in the response of the MLSA to a public question from 4 January 2022:

<https://www.mpsv.cz/documents/20142/2783150/%C4%8D.j.+MPSV+2022-1589+Program+Antivirus.pdf/67f7c79f-7b60-521e-4a1e-02f19c532200>

Figure 6 Number of supported employees and total support (in CZK) under the Antivirus A Programme in March 2020-April 2021 in the Czech Republic

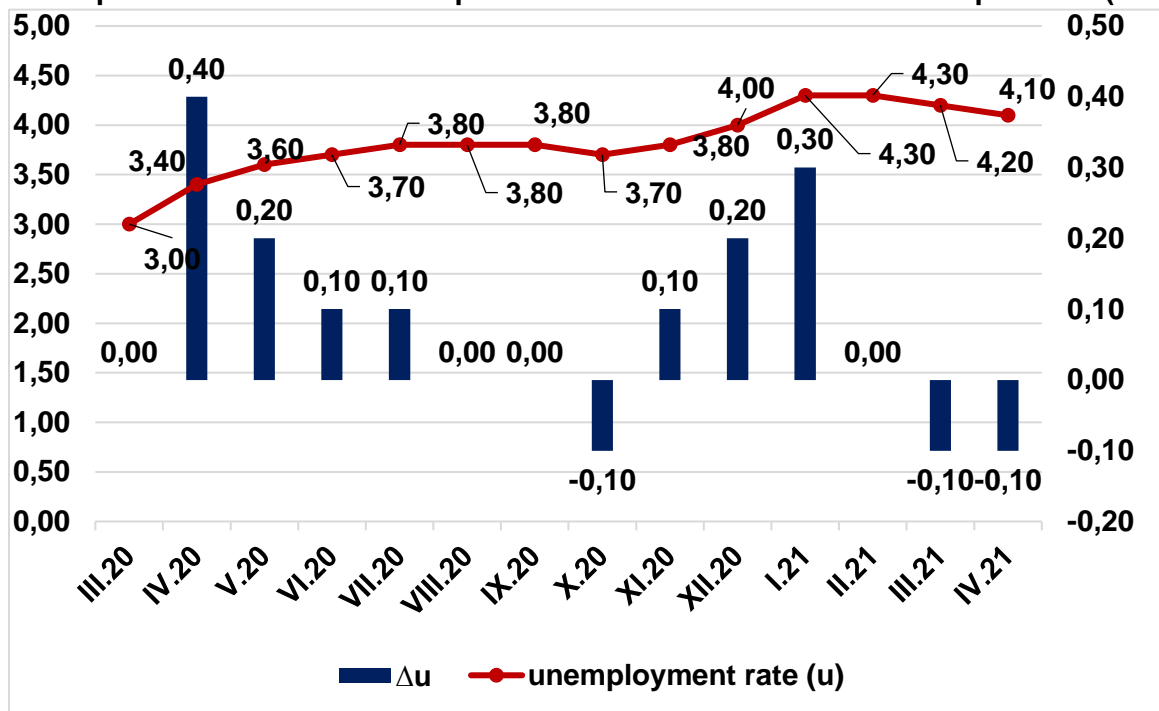


Source: own elaboration based on data from the MLSA (2021d)⁹

Figure 7 compares the values of the number of supported employees by Antivirus A Programme (Figure 6) and the total unemployment rate (Figure 7). We observe a specific correlation between the unemployment rate and the number of supported persons. In March-May 2020, unemployment rate started to rise, which, among other factors, could be the reason why the MLSA launched the Antivirus A Programme.

⁹ In the absence of statistics on the number of employees supported by each Antivirus Programme support area (A, B, and A+), we determine the number of persons supported in Figure 6 by calculation. Calculation procedure: multiply the total number of employees supported under the Antivirus Programme by the ratio of the total amount of support under Antivirus A Programme (in CZK) and the total amount of support under the whole Antivirus Programme (in CZK), always for a given month. We round it arithmetically to the entire population.

Figure 7 Comparison of the number of assisted persons and the unemployment rate in the period March 2020-April 2021 in the Czech Republic (in %)



Source: own elaboration based on data from MLSA (2020b), MLSA (2021d), and MLSA (2021c)

As part of our analysis, we calculate the evolution of the estimated unemployment rate in the absence of any support for employees under the Antivirus A Programme. Table 3 shows this in absolute terms and as a percentage. From June 2020 to April 2021, the potential unemployment rate would differ from the actual rate by only 0.5-1 p. p.

Table 3 Estimated unemployment rate trends in the case of zero support from the Antivirus A Programme in the period March 2020-April 2021 in the Czech Republic

	Persons 15-64 years old total	Unemployment rate (u) (in number of persons)	Estimated u (in number of persons)	Estimated u (%)
III.20	6 791 179	225 678	449 800	6.60
IV.20	6 791 448	254 040	489 988	7.20
V.20	6 792 392	266 144	414 704	6.10
VI.20	6 793 869	269 637	284 012	4.20
VII.20	6 795 378	279 673	291 118	4.30
VIII.20	6 797 542	279 078	288 820	4.20
IX.20	6 799 963	277 015	287 423	4.20
X.20	6 800 471	271 685	313 980	4.60
XI.20	6 798 645	274 526	321 098	4.70
XII.20	6 796 488	291 977	327 939	4.80
I.21	6 662 998	308 859	356 457	5.30
II.21	6 661 420	311 463	348 808	5.20
III.21	6 660 584	306 616	361 871	5.40
IV.21	6 660 681	297 876	332 069	5.00

Source: Own elaboration based on data from CSO (2022f), MLSA (2020b), MLSA (2021c), and MLSA (2021d)¹⁰

Table 4 shows how much money (in EUR) MLSA paid to support employment under the Antivirus A Programme and, therefore, how much it has cost taxpayers to reduce unemployment rate by one p. p. The amounts for reducing unemployment rate in the CR by one p. p. in March 2020-April 2021 range from CZK over 140 million (July 2020) (EUR almost 6 million) to CZK over 800 million (November 2020) (EUR over 30 million). Thus, the Antivirus A Programme cost the taxpayer CZK over 10.5 billion (EUR over 444 million) over its entire duration.

According to Bajgar et al. (2021), on average, one third of Czech employees can work from home. Naturally, the ability to work from home depends on the sector, e.g. in the financial or IT sectors, it is possible for 4/5 of employees to work from home. Conversely, only 1/5 of Czech employees in the cultural or agriculture sectors can work remotely. By these numbers, CZK 3.5 billion (EUR 0.15 billion) provided under the Antivirus A Programme could have been saved (own calculation¹¹ based on Bajgar et al., 2021 and MLSA, 2021d).

¹⁰ Due to the lack of data on the monthly evolution of the population aged 15-62, we had to estimate the values by calculation. Calculation procedure: multiplying the total number of inhabitants in a given month according to the CSO (2022f) and the coefficient 0.635, which represents the percentage of the age structure according to the 2021 census conducted by the CSO (2021). The subsequent rounding was done arithmetically to whole persons. We determined the absolute estimated number of unemployed persons as the sum of the unemployed persons and the population supported under the Antivirus A Programme. The procedure for calculating the estimated unemployment rate: the share of estimated unemployment in the population and persons aged 15-64 multiplied by 100. The value was rounded arithmetically to one decimal place (the value in which the MLSA gives the unemployment rate).

¹¹ Calculation procedure: 1/3 of whole payment (in CZK) to Antivirus A Programme supported workers.

Table 4 Amount saved from the Antivirus A Programme by not supporting workers who can work from home in the Czech Republic (in CZK)

	Difference between estimated u and actual u (%)	Overall support under Antivirus A Programme (in CZK)	Saved amount from Antivirus A Programme by not support workers who can work from home
III.20	3.60	1,890,483,634	630,161,211.3
IV.20	3.80	2,915,182,948	971,727,649.3
V.20	2.50	1,212,774,326	404,258,108.7
VI.20	0.50	106,331,829	35,443,943
VII.20	0.50	70,192,146	26,397,382
VIII.20	0.40	57,958,745	19,319,581.67
IX.20	0.40	65,912,723	21,970,907.67
X.20	0.90	371,143,643	123,714,547.7
XI.20	0.90	731,027,144	243,675,714.7
XII.20	0.80	348,388,820	116,129,606.7
I.21	1.00	762,090,871	254,030,290.3
II.21	0.90	566,014,043	188,671,347.7
III.21	1.20	901,449,215	300,483,071.7
IV.21	0.90	505,931,329	168,643,776.3

Source: own elaboration based on data from MLSA (2020b), MLSA (2021c), Bajgar et al. (2021) and MLSA (2021d)¹²

We estimated a function based on data from the CSO (2022g) on year-on-year changes in the inflation rate in individual months between March 2020 and April 2021 and empirical unemployment rates over the same period:

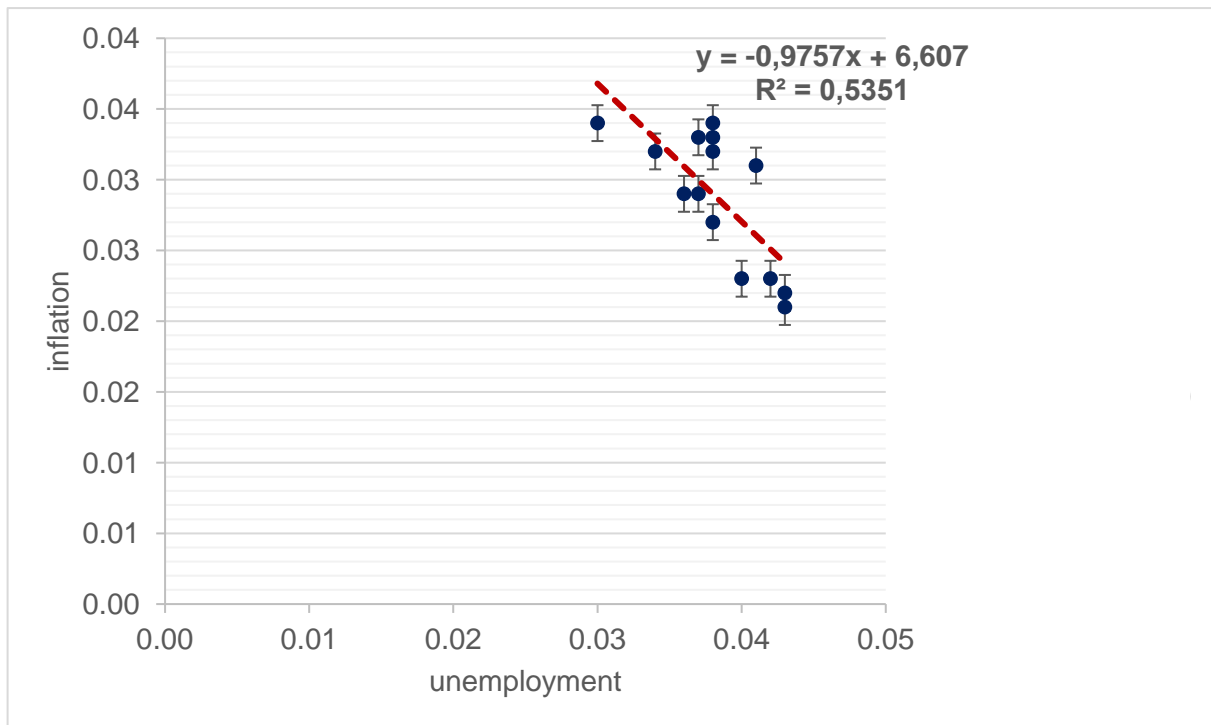
$$(1) \quad y = 6.607 - 0.9757x$$

Where: x = the unemployment rate; and
 y = the annual inflation rate in a single month.

The model described above explains 53.51% of the squares. We reject the null hypothesis at the one percent significance level (p -value equal to 0.0029). Therefore, the model is statistically significant. The function is estimated linear since our designed model uses assumption *ceteris paribus*. The simplified short-run (SR) Phillips curve (PC) model described above is a PC in the sense of Samuelson and Solow (1960), as shown in Figure 8.

¹² Calculation of the amount of unemployment reduction by one p.p. (in CZK): the share of total support under the Antivirus A Programme (in CZK) and the difference between estimated and actual unemployment rate (in %). Transfer from CZK to EUR is at the CNB exchange rate as of 10 February 2023, 11:15 a.m.

Figure 8 Short run Phillips curve for the Czech Republic in the period March 2020-April 2021

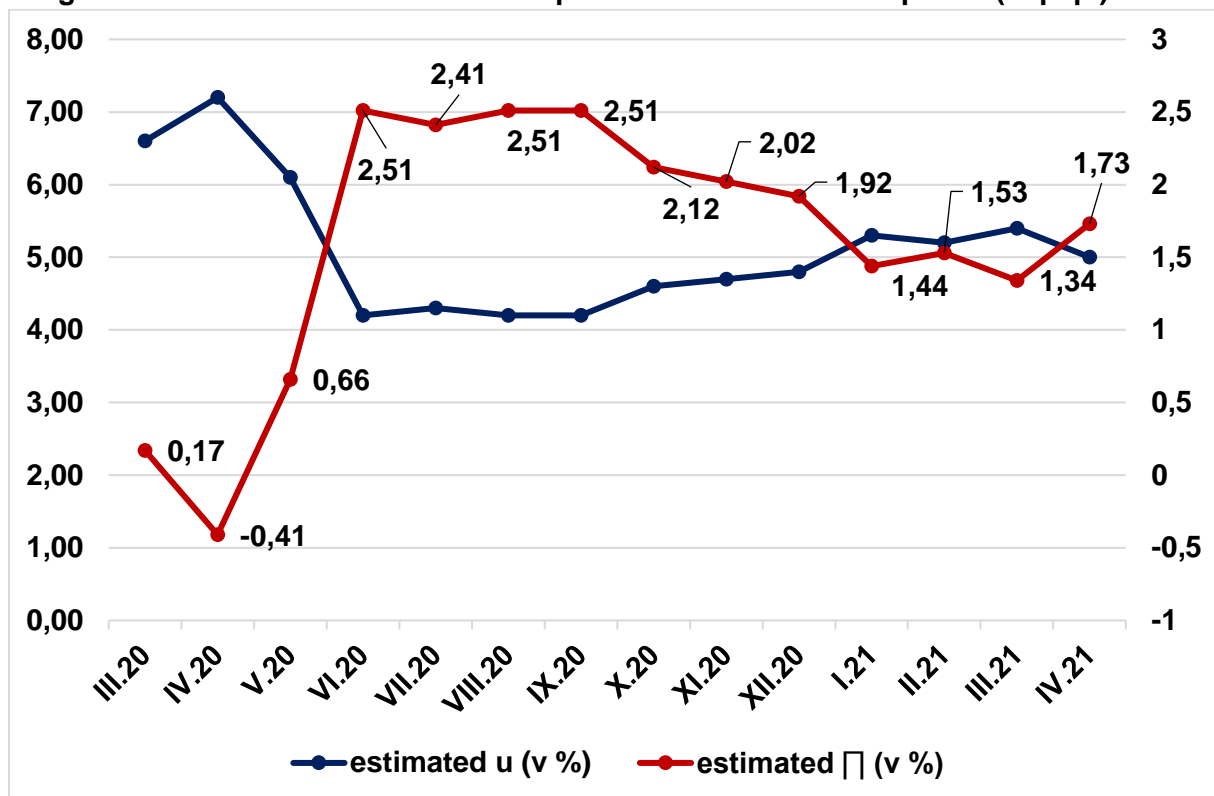


Source: own elaboration based on data from the MLSA (2021c), MLSA (2020b), and CSO (2022g)

By applying the values of the estimated unemployment rate under the assumption of zero employment support from the Antivirus A Programme to equation (1), we can estimate the inflation trend in the CR in the period March 2020-April 2021, as shown in Figure 9. The estimated inflation rate would differ from the empirically measured one (always the lower value of the possible inflation rate) by between 0.38 p.p. and 3.61 p.p. On average, estimated inflation rate would be 0.99 p.p. lower for entire duration of the Antivirus A Programme¹³. Thus, if one third of the workers who could have worked from home during the COVID-19 pandemic had not been supported by the Antivirus A Programme, the reduction in inflation would have been approximately 0.66 p.p.

¹³ Calculation procedure: geometric average of the possible inflation rates (in %) shown in Figure 9.

Figure 9 Estimated inflation rate trend in the case of zero support under the Antivirus A Programme between March 2020 and April 2021 in the Czech Republic (in p. p.)



Source: own elaboration based on data from the MLSA (2020b), and MLSA (2021c)

5. Economic and political implications of the Antivirus A Programme

Based on the monthly empirical data analysis of the Antivirus A Programme and the unemployment rate in Section 4, we estimated taxpayers' payment for the reduction in unemployment caused by employers' inability to pay their employees while quarantined due to the COVID-19 pandemic. In addition, we estimated a linear function from the SR PC model that determined, assuming *ceteris paribus*, the estimated inflation rate that would have been achieved in the event of increased unemployment if MLSA had provided no support for employees under the Antivirus A Programme.

All calculations are subject to some simplification of reality. We cannot assume that all employees who received support from the MLSA under the Antivirus A Programme would have lost their jobs. Further, other employers/employees or self-employed workers may have received funding from the government under additional support during the pandemic. The potential unemployment rate could have been much higher than stated in Section 4.

We based the SR PC model of the possible correlation between the inflation rate and the unemployment rate on a *ceteris paribus* assumption that cannot be transferred to the real economy. The premise of the model is that the impact of the inflation rate is only by the unemployment rate. In a real economy, the inflation rate would then be influenced by the following factors, for example:

- inflation expectations of the population;

- a negative demand shock, mainly caused by the repeated near-total shutdown of the economy, which should have slowed the progress of the COVID-19 virus through society;
- the population's purchasing power in the face of a possible temporary reduction in income caused by the pandemic;
- the mood in society – the belief of people in the improvement or deterioration of the situation (preparation for worse times); or
- monetary factors – the behaviour of the CNB or monetary institutions in other countries affecting the Czech economy, e.g., possible measures by the ECB.

Friedman's criticism of PC in the sense of Samuelson and Sollow, and his disagreement with the possibility of interchanging inflation rate and unemployment rate, must also be considered. According to Friedman (1997, [1992]), this relationship is a dichotomy since inflation is always and only a monetary phenomenon. However, earlier Friedman (1977) argues that a correlation between inflation and unemployment can exist, but only in SR. However, the period March 2020-April 2021 is termed as SR.

Our analysis aims to make public legislative bodies in the CR aware that support under the Antivirus A Programme was a highly costly affair for taxpayers and should have been used with great care and discretion. As mentioned in Section 4, total employee support under the Antivirus A Programme during the COVID-19 pandemic exceeded CZK 10.5 billion (EUR 0.44 billion). However, this support did not provide the economic efficiency that can only exist in a free market, where efficiency is set by many of economic subjects. We argue that Czech government artificially (partially) plundered public budgets by prolonging the activities of the unprofitable companies that would otherwise be forced to close. Moreover, public budgets have been directed towards employment support under the Antivirus A Programme at a time of enormous government spending to support human health and the functioning of society during the COVID-19 pandemic. Indeed, given that the MLSA used the Antivirus A Programme to pay wages to employees who found themselves quarantined or isolated during the pandemic, inefficiencies may have arisen in the numerous situations in which employees could have worked from home (e.g. various office jobs). It appears that instead of merely working from a different geographic location, some employees applied for government support under the Antivirus A Programme since it could be individually an optimal choice (e.g. spending more time with family).

Therefore, the state should provide benefits in a prudent, efficient, and fiscally sound manner. The government could learn not only from the inefficiency of the Antivirus A Programme, but also from crises linked to the conflict in Ukraine (e.g. migration of Ukrainian and Russian citizens and the energy crisis), which we are currently experiencing. The government should set up an appropriate system of support for its citizens such that it focuses on economic and social efficiency.

Our findings show that the monthly transfer for reducing unemployment rate by one p.p. amounted to almost CZK 0.5 billion (EUR 0.02 billion) on average. This raises the question as to whether it would have been possible to allocate these employees to other vacancies. Table 5 shows the vacancy data compared with the number of employees supported under the Antivirus A Programme. From the data in Table 5, it is clear that all employees funded under the Antivirus A Programme could have found employment elsewhere. Of course, one

has to consider, for example, the increase in job applicants in the absence of other support programs during the pandemic or the need to retrain employees. However, as mentioned above, our analysis is aimed at reducing inefficiencies in the public sector and raising public authorities' awareness of the need for a careful assessment of public spending. The Antivirus A Programme could also have been significantly reduced, for example, by the possibility of working from home for a significant proportion of the supported employees.

Table 5 Comparison of the number of vacancies and the number of employees supported by Antivirus A Programme in the period March 2020-April 2021 in the Czech Republic

	Number of employees supported	Number of vacancies
III.20	224,122	342,287
IV.20	235,948	332,748
V.20	148,560	331,050
VI.20	14,375	334,904
VII.20	11,445	334,283
VIII.20	9,742	340,823
IX.20	10,408	316,658
X.20	42,295	310,730
XI.20	46,572	317,972
XII.20	35,962	318,582
I.21	47,598	325,425
II.21	37,345	330,735
III.21	55,255	338,862
IV.21	34,193	343,407

Source: own elaboration based on data from MLSA (2020b), MLSA (2021d), and MLSA (2021c)

According to the MLSA (2020c), the objective of the Antivirus Programme (A, B, A+, and C) was to return the economy to recovery after the economic crisis caused mainly by the restriction of activities of all economic entities under quarantines during the pandemic, which aimed to limit the spread of the COVID-19 virus through society. The Czech Labor Office (CLA) has concluded support agreements (in total in the whole Antivirus Programme) with 99.1% of the employers who requested an agreement. However, support for employees affected by quarantine or isolation (part of the Antivirus A Programme) was not further conditioned (MLSA, 2020c). Thus, the abuse of benefits described above, i.e., the possibility for a certain proportion of employees affected by quarantine but not by the COVID-19¹⁴ virus itself, to work from home, was certainly not eliminated. Finally, the problematics is also linked to political budget cycles in the EU - politicians wanted to be re-elected and so favoured short-term and short-sighted solutions (Bednar, 2019).

It is therefore important for Czech policymakers to be aware of the possibilities of misuse of benefits provided by them and to focus on the highest possible efficiency in the use of public

¹⁴ The programme to support workers affected by the COVID-19 virus was subject to support included in another programme.

finance. It is worth recalling the general budget deficit, caused mainly by social support during the COVID-19 pandemic, which reached CZK 367.4 billion (EUR 15.54 billion) in 2020 (MF CR, 2021) and even CZK 419.7 billion (EUR 17.75 billion) in 2021 (MF CR, 2022c).

Conclusion

The Antivirus Programme, approved on March 31, 2020, in its entirety aimed to maintain employment levels by partially compensating wages for quarantined workers or workers who could not work due to government restrictions. In total, almost CZK 50 billion (EUR 2.12 billion) was paid out under this programme. Support paid under the A+ and B programmes ended on 31 May 2021, support paid under the A programme ended on 31 October 2021.

Similar employment programmes were established in most EU countries. However, they differed in their specific set up. Strategies applied to boost employment levels differed mainly in terms of targeting, levels of compensation, specific forms and limits. In the CR, as in e.g. France, the aid was not targeted to the most productive firms, unlike in Italy and Germany. From this point of view, Italy and Germany provided more efficient support programmes for reducing the unemployment level.

The Antivirus Programme was one of the components of public finances directed to support the economy during the pandemic in order to break the supply shock to the economy. Therefore, we began this paper with a brief analysis of the evolution of public finances in the CR during the COVID-19 pandemic. The structural deficit relative to GDP reached 2.6% in 2020 and 4.1% in 2021. The CR has thus ceased to comply with the rule set by the Fiscal Compact, which allows a maximum deficit of 1% of GDP. We also investigated the development of sectors that received government support (trade, accommodation and hospitality, and manufacturing). These sectors experienced a large fall in sales or output and greater increase in the unemployment rate than the rest of the economy. We conclude that the Antivirus A Programme has helped to mitigate the fall in employment in those sectors.

We find that the Antivirus A Programme cumulatively reduced unemployment rate in the CR by 18.3% during its operation. Further, the Antivirus A Programme cost taxpayers CZK over 10.5 billion (EUR over 444 million) over its entire duration. We constructed the SR PC for the CR and by using this simplified economic concept, we calculate that the potential inflation rate would have been lower by 0.99 p. p. for entire duration of Antivirus A Programme. If the Antivirus A program had been applied only to people who could not work from home, then the resulting reduction in the inflation rate over the entire period would have been 0.66 p.p.

Although the Antivirus A Programme fulfilled its purpose and appears to have been well set up (even in the international comparison) we argue that it has come at a cost in the form of a higher inflation rate. We also point out that anyone who was in quarantine or isolation could have received support under the programme even though in many cases these people may have been working outside their place of employment. In general, the Antivirus A Programme has not enabled Schumpeter's creative destruction, which would have cleansed the market of firms that do not prosper in the long term (Schumpeter, 2004 [1942]).

Evaluation of government support during the COVID-19 pandemic worldwide should be part of a larger economic evaluation. For example, further research could be conducted on the

subsequent development of firms supported by programmes related to restrictions imposed during the pandemic.

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