7. The impact of EU programmes on economy in the Czech Republic

In the course of the analysis, the impact of EU programmes on the Czech economy was identified and **there was a direct link established between the use of EU programme funding and positive changes in GDP and overall employment.** This relation between EU programmes drawing and increased GDP/employment was modelled in a QUEST model, which is largely used to model the impact of programmes financed via European sources (on the national level, the Office utilizes QUEST to demonstrate the impact of ESIF). The model used in this Report is a result of cooperation among the Ministry of Finance of the Czech Republic, the Office and Deloitte. The particular macroeconomic modelling work was conducted by the macroeconomic modelling team of the Ministry of Finance and forms also a part of the Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project. On part of the Project, the experts responsible were Mrs. Kateřina Gawthorpe, Mr. Zbyněk Štork and Mr. Stanislav Volčík. Reference to the project of the macroeconomic modelling team is provided in the following figure:

EUROPEAN UNION
Cohesion Fund
Operational Programme Technical Assistance

Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project conducted through the Technical Assistance Operational Programme 2014-2020 under the registration number: CZ.08.1.125/0.0/0.0/15_001/0000176

The modelling work was based on data on the financial allocation to the Czech Republic through EU programmes between 2014 and 2019 published by Directorate-General Budget (DG BUDG).[1]

Description of the model

The QUEST model is one of the main tools used by the European Commission for quantifying the potential macroeconomic impact of economic policies. It was developed at the Directorate-General for Economic and Financial Affairs (DG ECFIN).

The origins of the model date back to 1991; its first version aimed to analyse the European Community Member States at that time, and their interactions with other economies, in particular the USA and Japan. The second version advanced the model for a more elaborated theoretical structure with dynamics derived as an optimizing behaviour of agents and dependent on the agents' expectations.

More recently, the model consists of several versions. As the main successor, QUEST III is a calibrated model serving for the analysis of the euro area countries (Ratto, Roeger & Veld (2009)). In particular, it improves the previous generation of the model by incorporating a stochastic trend and introducing additional economic shocks to foreign trade and exchange rates, to reflect the open character of the euro area. It also incorporates financial, product and labour market rigidities and, finally, it recasts the government sector as a stabilizing element on the demand side of the economy.

The most relevant extension for this study is the QUEST III version of the model with the research and development (R&D) sector (Varga and Veld, 2009), which enables analysing the effects of structural reforms and cohesion policy.

The QUEST III R&D model originates in the New Keynesian economic theory with microeconomic foundations. It is a macroeconomic dynamic general equilibrium (DSGE) model. It consists of several interrelated blocks that aim to approximate the behaviour of economic agents. Households consume goods and services, offer their labour on the labour market and earn wage, make investments, pay taxes and receive transfers where appropriate. Firms hire factors of production in the form of labour and capital and produce final products. Economic agents pay taxes to the government budget and receive subsidies. The fiscal authority performs a stabilizing function using funds raised from tax revenues and bond issues. The monetary authority is responsible

[1] https://ec.europa.eu/budget/graphs/revenue_expediture.html

for setting interest rates in line with economic developments. This structure is the same for all three geographic areas included in the model, for the small open Czech economy, the euro area and the rest of the world.

The model captures the inter-linkages between variables, the multiplier effects of shocks and the spillover effect of shocks within an economy, but also between the economies of the European Union and the rest of the world, making it ideal for modelling the impact of cohesion policies and other EU programmes. The model design introduces the transmission mechanisms of cohesion policies. For example, the model reveals investing in science and research to lead to a labour reallocation in favour of scientific positions and investing in the private sector to reduce fixed costs and boost competition.

Limitations

Data collection for this Project part was, however, accompanied by several difficulties. Firstly, the contacted DGs and executive agencies responsible for the EU programmes did not have Czech EU programme data available in the same format – some data could provide a more detailed look into allocation distribution across specific areas,[2] some were solely on the total sum level, in many cases, the data was missing or was not readily available.[3] Secondly, there are multiple data sources at the EU level and various teams (DG BUDG, DG Research & Innovation etc.) collect/record data with varying methodologies (operational vs. financial programme data). Lastly, even when DG BUDG source was selected as the principal data source for macromodelling, it did not include a complete dataset for this Project (data on the Structural Reform Support Programme had to be requested from the Office, which is the programme's NCP).

Results

Nevertheless, the macromodelling work was productive and delivered a **clear evidence of the EU programme significance for the economic advancement of the Czech Republic**. In the following sections, the overall impact of EU programmes on Czech GDP and employment is analysed. Furthermore, the analysis encompasses scenario-based comparisons while the basic scenario (impact of EU programmes in conditions of their current use) is set against two alternative scenarios indicating a 10% and 30% increase in EU programme drawing respectively. These comparisons enable to see what potential benefits could stem from a stronger encouragement of EU entities to participate in EU programmes. It is, however, necessary to highlight that the **macroeconomic modelling in this Project took into consideration only financial contributions received by the Czech Republic under EU programmes in the period of 2014–2019.**

The figures below demonstrate a significant impact of financial allocations under EU programmes in the said period on the Czech economy. The utilisation of EU programmes in their current scope is expected to bring an additional CZK 42.6 billion to the real Czech GDP, and to create almost 24 thousand additional jobs by 2027 (considering the current participation rate of Czech entities will not change). A 10% increase in the use of EU programmes would see the total GDP impact rise to CZK 48.5 billion, creating around 28 thousand additional jobs; a 30% increase in the use of EU programmes would bring a total added real GDP value of CZK 57.4 billion, adding 33 thousand new jobs through 2027.

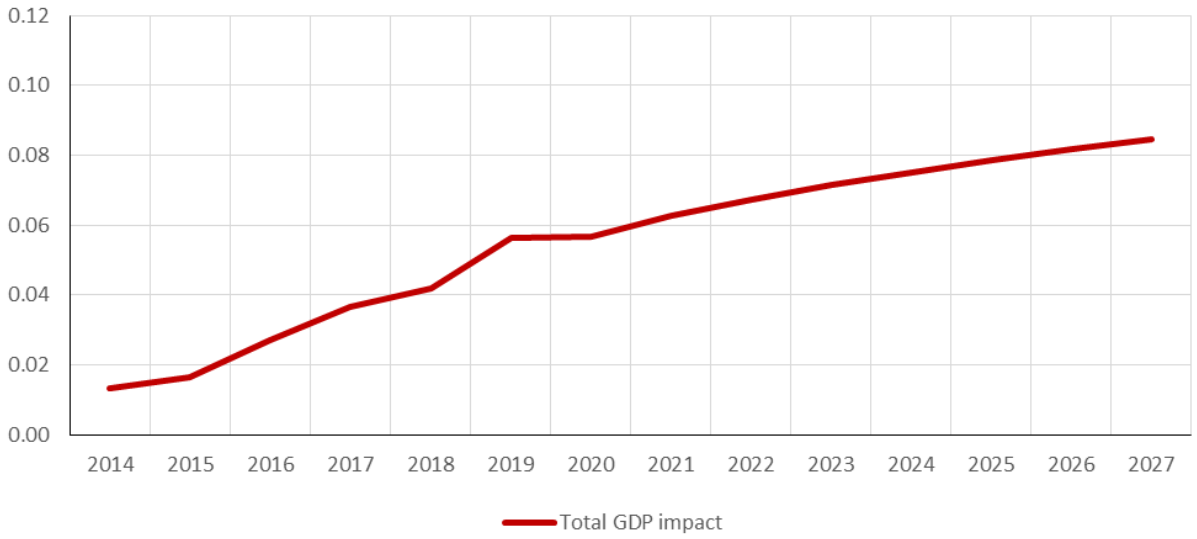
Impact on GDP (3 scenarios)

Our estimates show a continuously increasing effect to over 0.08% of additional real GDP every year, as shown in Figure 1. Cumulatively the EU programmes will create almost 0.8% of additional real GDP. The contribution to this overall impact depends on the type of investment. The most considerable contribution stems from the R&D programmes; closely followed by human resources type of investments. The benefits of these two areas increase over time. Furthermore, infrastructural projects contribute with a significantly lower share of GDP, while the least productive expenditure concerns technical assistance. While the technical support covers administration costs

[2] Specific areas relevant to the QUEST model were research and development support, expenditure on human resources, infrastructure and technical assistance.
[3] There was an ongoing collaboration with DG REFORM to gather data from other DGs, still, it was very demanding to get hold of the required data.

and is thus not productive from the long-term perspective, it is a necessary expenditure for the successful implementation of the previously mentioned areas.

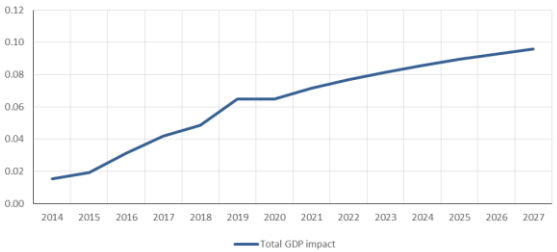
Figure 1: Impact on real GDP - basic scenario (% of real GDP)



Source: Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project calculations.

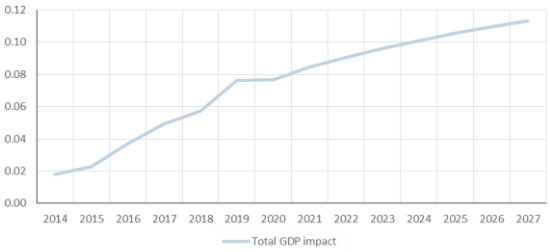
Figure 2 and Figure 3 display the impact of two alternative scenarios, a proportional 10% and 30% increase in the EU expenditures. The higher expenditures result in higher GDP growth. Cumulatively, 10% higher funds create an additional 14% of the output, while a 30% increase brings an almost 35% higher GDP level relative to the benchmark scenario.

Figure 2: Impact on real GDP – 10% increase (% of real GDP)



Source: Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project calculations.

Figure 3: Impact on GDP – 30% increase (% of real GDP)

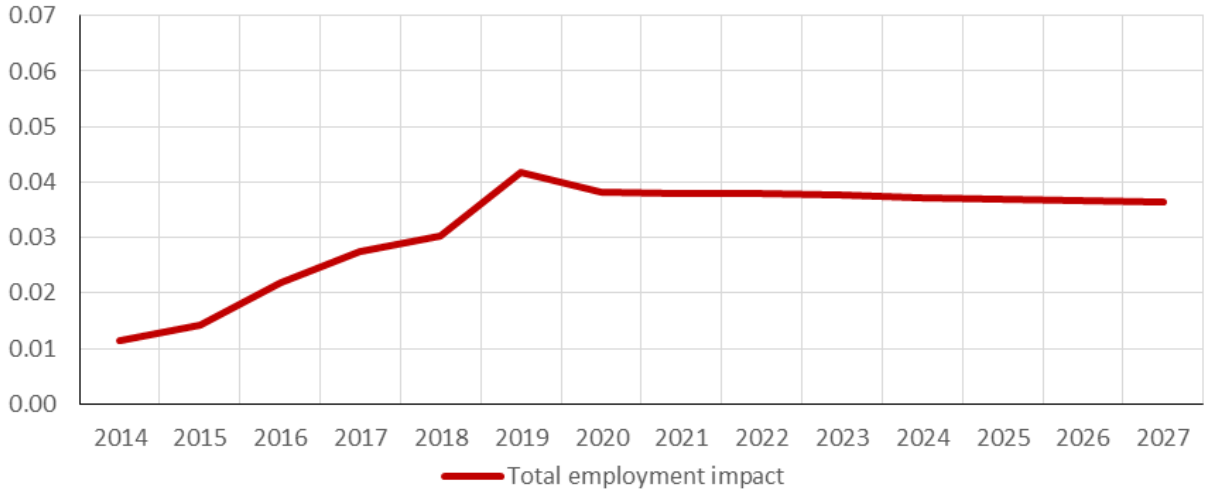


Source: Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project calculations.

Impact on employment (3 scenarios)

We estimate that EU programmes will create an additional 23.7 thousand jobs for the examined horizon. Unlike in the case of GDP gains, the most considerable employment impact stems from the area of human resources, which would bring additional job creations through education and requalification. This is followed by contributions of the R&D area and finally also the contributions of the other two areas to the overall employment increase.

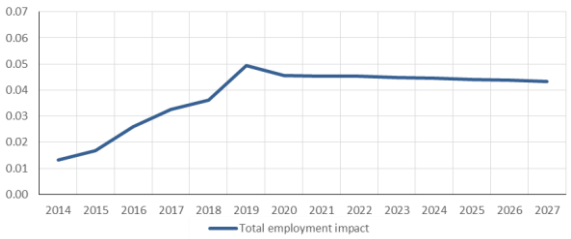
Figure 4: Impact on employment – basic scenario (% of employment)



Source: Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project calculations.

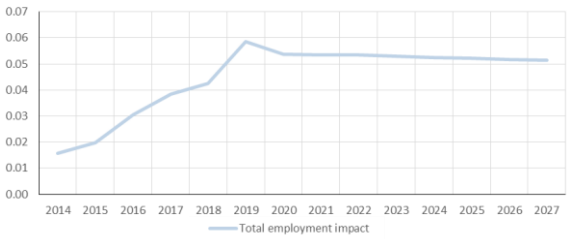
Alternative scenarios do cause more significant positive employment effects. The 10% scenario brings an additional 19% gain in employment representing some 4.5 thousand jobs, and the 30% scenario an increase of 40% (9,6 thousand jobs) compared to the benchmark scenario.

Figure 5: Impact on employment - 10% increase (% of employment)



Source: Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project calculations.

Figure 6: Impact on employment - 30% increase (% of employment)

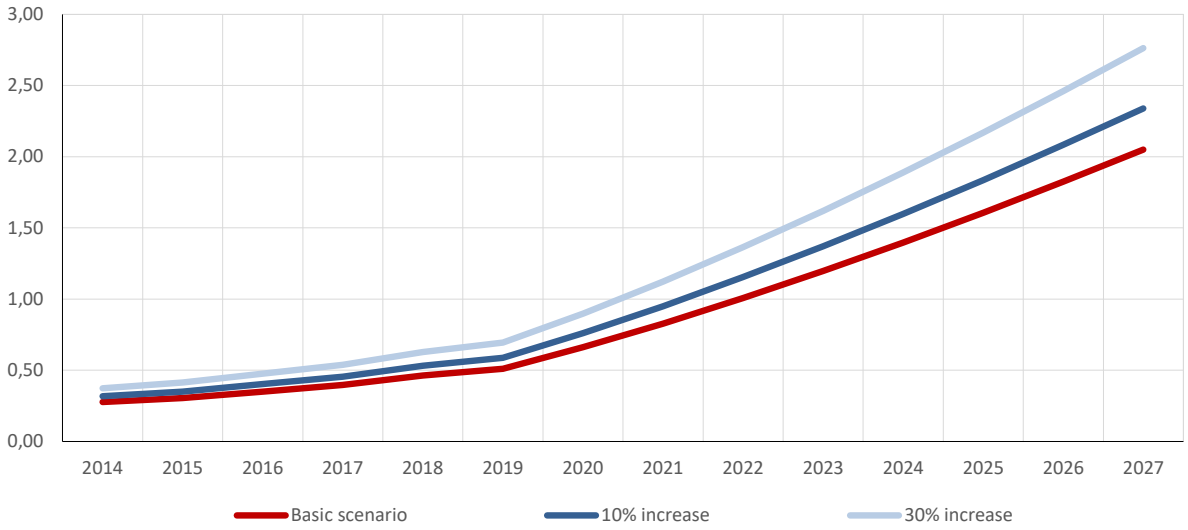


Source: Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project calculations.

Cumulative GDP multiplier (comparison of variants):

Figure 8 compares the additional GDP increase relatively to the expenditure. In other words, how many extra crowns of GDP are cumulatively gained per crown invested. The model outcome suggests the unit threshold will be crossed in 2022 for the benchmark scenario for all EU programmes. The alternative scenarios reach the unit border approximately one year faster. The difference between the scenarios' multipliers somewhat widens over time, ending up slightly over 2, at 2.3 and 2.8, respectively.

Figure 7: Cumulative GDP multiplier (additional GDP per crown invested)



Source: Systemic support for a common European support and assistance policy, ESI and similar funds at the Office of the Government of the Czech Republic project calculations.

This project was carried out with funding by the European Union via the Structural Reform Support Programme and in cooperation with the Directorate General for Structural Reform Support of the European Commission.

1. Annexes

1.1 List of conducted interviews with the EU programmes' responsible entities

No.	EU programme	Interviewee	Date
1	AMIF	The Ministry of the Interior of the Czech Republic	19. 2. 2021
2	CE Culture	Arts and Theatre Institute	8. 2. 2021
3	CE MEDIA	National Film Archive	18. 1. 2021
4	CEF Energy	Ministry of Industry and Trade	3. 2. 2021
5	CEF Telecommunication	Ministry of the Interior of the Czech Republic	3. 2. 2021
6	CEF Transport	Ministry of Transport	9. 2. 2021
7	Digital Europe	Ministry of Industry and Trade	10. 2. 2021
8	EaSI	Ministry of Labour and Social Affairs	3. 2. 2021
9	EGF	Ministry of Labour and Social Affairs	4. 2. 2021
10	Erasmus+/ European Solidarity Corps	Czech National Agency for International Education and Research	2. 2. 2021
11	European Defence Fund / European Defence Industrial Development Programme	Ministry of Defence of the Czech Republic	10. 2. 2021
12	Europe for Citizens/Rights and Values Programme	The Office of the Government of the Czech Republic	18. 1. 2021
13	EU Space programme	Ministry of Transport	2. 2 .2021
14	EU Structural Reform Support Programme	The Office of the Government of the Czech Republic	18. 1. 2021
15	EU4Health	Ministry of Health of the Czech Republic	did not take place due to the Ministry's insufficient capacities during the pandemic
16	Horizon 2020	Technology Centre of the Czech Academy of Sciences	11. 2. 2021
17	Justice	Ministry of Justice	10. 2. 2021
18	LIFE	Ministry of the Environment of the Czech Republic	25. 1. 2021
19	Single Market Programme	Ministry of Industry and Trade	29. 1. 2021
20	Union Civil Protection Mechanism	Fire Rescue Service of the Czech Republic	4. 2. 2021
Other relevant			
21	Financial aspects relevant to the EU programmes	Ministry of Finance of the Czech Republic	11. 2.2021

1.2 List of sources used for macroeconomic modelling

No.	Name
1	Ratto, M., Roeger, W., & In 't Veld, J. (2009). QUEST III: An Estimated DSGE Model of the Euro Area with Fiscal and Monetary Policy. Economic Modelling, Vol. 26(1) pp. 222-233.
2	Varga, J. a In 't Veld, J. (2009). A model-based analysis of the impact of Cohesion Policy expenditure 2000-06: simulations with the QUEST III endogenous R&D model. European Economy - Economic Papers 2008 - 2015 387, Directorate-General for Economic and Financial Affairs (DG ECFIN), European Commission.