

PARITA KUPNÍ SÍLY JAKO ALTERNATIVNÍ FINANČNÍ UKAZATEL PRO HODNOCENÍ ÚČASTI V PROGRAMU HORIZONT 2020 A DALŠÍCH RP

Abstract: The article briefly discusses the possibility of using purchasing power parity as an alternative financial indicator for assessing the participation of individual EU and associated countries in the Horizon 2020 programme and in other FPS. The application of purchasing power parity can serve as an alternative view of how the Czech Republic is doing financially within these programmes. The example of the H2020 programme shows that financial indicators for the Czech Republic (and for a number of other new EU Member States) are not nearly as unfavourable as it seems when working only with nominal values.

Abstrakt: Článek se stručnou formou zabývá možností využití parity kupní síly jako alternativního finančního ukazatele pro hodnocení účasti jednotlivých zemí EU a asociovaných zemí v programu Horizont 2020 a dalších RP. Použití parity kupní síly může sloužit jako alternativní pohled na to, jak si ČR vede z finančního hlediska v rámci těchto programů. Na příkladu programu H2020 je vidět, že finanční ukazatele pro ČR (a i pro řadu dalších nových členských zemí EU) nejsou zdaleka tak nepříznivé, jak se při práci pouze s nominálními hodnotami zdá.

INTRODUCTION

The basic characteristics of monitoring the Czech Republic's participation in the Framework Programmes of the European Union for Research and Development (hereinafter referred to as "EU" and "FPS") include, among other things, the so-called nominal financial indicators – i.e. amounts presented in the Euro currency as collected in the non-public database eCorda¹ of the European Commission's Directorate-General for Research and Innovation and presented to the public through the interactive visualization of the European Commission's Horizon Dashboard².

Subsequently, the eCorda database serves as the main source of information for the creation of reports of the CAS Technology Centre on the participation of the Czech Republic in the FPS and for the preparation of other analytical materials. Among other things, they monitor the financing of FP projects in individual EU Member States and in associated countries to FP³. At the same time, the EU's "financial contributions are a key issue in understanding EU-13 participation" in the FPS for Research and Development (Pazour et al. 2018, p. 47). Financing of projects with Czech participation is compared with financing of projects in old and new EU Member States⁴. Individual authors point to a lower average level of support from the FPS budget for the Czech Republic and the new EU Member States compared to the old countries (e.g. Pazour et al. 2018), even in cases where these values are recalculated, for example, to 1 participation per 1 million inhabitants (e.g. Frank, Albrecht 2016; comparison of the participation of entities for Prague and selected European cities, Vojtěch 2019) or per unit of expenditure on research and development (Frank 2021).

In the context of financial indicators and their subsequent use in specific analyses, the Horizon 2020 programme ('H2020') and other FPS often pays close attention to personnel costs, as there are significant differences in the modalities and levels of remuneration between old and new EU Member States, as well as between new Member States (Chvojková 2020). According to the European Court of Auditors (2018), "personnel costs are a key cost category, accounting on average for approximately 45 % of the total costs of H2020 research projects". According to expert estimates of the Technology Centre of the Czech Academy of Sciences, their representation is even 70–80%, according to the Austrian Research Promotion Agency 60–90% depending on the specific project. The results of the H2020 audit presented in Prague on 14 May 2019 also indicate a 75% representation of personnel costs in the total costs of H2020 projects (Bancos 2019). The FP H2020 and Horizon Europe payroll rules, as amended on 29 June 2022, "fully respect the level of remuneration set in each institution" and the level of remuneration under these programmes should correspond to the normal level in each country or organisation. Since there are significant differences between EU Member States in the performance of their economy, the standard of living and therefore also wage and price levels, we consider it useful to use an alternative financial indicator to evaluate the Czech Republic's participation in the H2020 programme and thus contribute to the discussion within the framework of the final evaluation of this programme.

Eurostat, the Organisation for Economic Co-operation and Development or the World Bank use the purchasing power standard in addition to nominal indicators in Euro or US dollars, which, unlike nominal indicators, takes into account the difference in price levels between

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countries (including in countries using the common currency), in addition to nominal indicators. When using nominal values, countries with high price levels show higher values of economic aggregates than countries with lower price levels. That is why the basic indicator of EU regional policy is gross domestic product (“GDP”) per capita expressed in purchasing power standard (“PPS”). This indicator then determines the achievable amount of support from the European Structural and Investment Funds. For instance, according to Eurostat data, the Czech Republic reached 67% of the EU27 average in 2020 when expressing GDP in € per capita and 93% in terms of purchasing power parity. Similarly, e.g. Slovenia – 75% of the EU27 average in GDP/person in € and 89% of the EU27 average in GDP/person in PPS. The GDP indicator is supplemented (e.g. Mejstřík 2015) by the indicator of net disposable household income per 1 inhabitant in order to determine what part of it remains available to the permanent resident population. Eurostat also reports the net disposable household income indicator in PPS. Individuals and individual organisations also work with the principle of purchasing power parity – when planning foreign trips, business trips, internships or employment relationships abroad, they compare the domestic and foreign price levels. That is why, and given the significant proportion of personnel costs in the total FPs costs – and the proximity of personnel costs to the indicator of net disposable household income, as well as the fact that Eurostat includes household consumption (co-financed by FP in this particular case) in the calculation of purchasing power parity – the quantification of financial support in purchasing power standard using the example of the H2020 programme seems appropriate.

SOURCE DATA FOR ANALYSIS

Extracts from the eCorda database were used to convert the financial data of H2020 and FP7 projects into purchasing power parity – for H2020 as of 17 May 2022, for FP7 as of 30 April 2021. In terms of the type of participants, only the so-called beneficiaries were included in the analysis.

In the H2020 programme, 35,931 projects were evaluated, in which 159,592 participations were recorded. The total cost of participants in these projects amounted to €83.55 billion and the EU contribution to these projects amounted to €68.63 billion. In FP7, 25,809 projects were evaluated with 139,241 recorded participations. The total cost of participants in these projects amounted to €65.91 billion and the EU contribution to these projects amounted to €46.09 billion.

Participants’ costs and EU contribution were aggregated by participant’s country. For H2020, the data for the 37 countries, which Eurostat allows for comparison, cover 97% of the total cost of the participating beneficiaries as well as the same share of the EU contribution. In the case of FP7, this share is 96%.

Detailed statistics on the participation of individual countries in H2020 are presented by Frank (2021). For this reason, the purpose of this contribution is only to present to the reader the position of countries according to financial indicators converted into purchasing power standard. For this purpose, amounts have been calculated separately for coordinators and project participants, as ‘coordinators receive a bigger proportion of the project budget’ (Pazour et al. 2018, p. 48).

METHODOLOGY FOR CALCULATING PURCHASING POWER PARITY

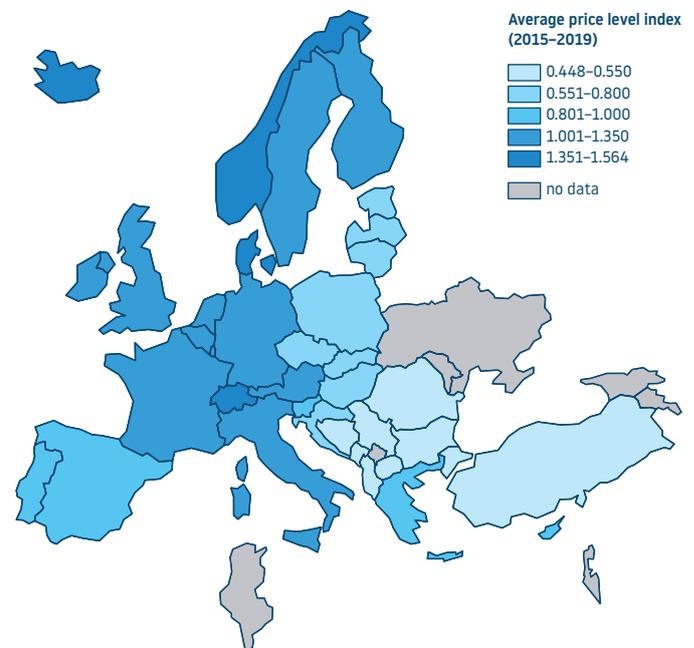
In order to quantify the costs of H2020 projects and the amount of EU support per country, the price level index i_t was first calculated for each country and for each year in the period 2014–2020, $i_t = P_e / P_p$, where P_e is GDP expressed in € and P_p is GDP expressed in PPS. For the sake of consistency of data and methodology, Eurostat was chosen as the data source, which as of 18 April 2022 had data for 27 Member States, selected associated countries and the United Kingdom⁵.

Eurostat does not have data for all associated countries for H2020 and FP7 – therefore Armenia, the Faroe Islands, Georgia, Israel, Kosovo, Moldova, Tunisia and Ukraine do not enter into the analysis presented. If the calculated price level index was higher than 1, these were countries with a higher price level (and a higher nominal GDP than real GDP). If the index was lower than 1, on the contrary, these were countries with a lower price level (and thus a lower nominal GDP than real GDP).

The time series obtained in this way was balanced using the method of simple three-member moving averages, $\bar{x}_t = (i_{t-1} + i_t + i_{t+1}) / n$, where i_t are the price level indices for individual years and n is the number of evaluated years. As a result, the indices for 2014 and 2020, respectively 2007 and 2013 were omitted. Subsequently, the simple three-member moving averages yielded the average value of the price level index for the period 2015–2019 and 2008–2012, that is $\bar{i} = (\sum \bar{x}_t) / n$, for each country. The nominal amounts of the total cost of projects and EU support for each country were then divided by this value.

For example, the values of the price level index for the Czech Republic in the period 2014–2020 amounted to 0.64–0.73, the average value of \bar{i} for the whole period was 0.69. By comparison, in Denmark, in the same period, the index was 1.33–1.37, while the average value of \bar{i} over the whole period was 1.35 (Cartogram 1). If the total cost of the beneficiaries’ participations in H2020 for the Czech Republic is €591 million and the EU contribution is €497 million, then in purchasing power parity they amount to 857 million PPS and 720 million PPS respectively (Figure 2).

CARTOGRAM 1: COMPARISON OF EU COUNTRIES AND ASSOCIATED COUNTRIES FOR THE H2020 PROGRAMME ACCORDING TO THE AVERAGE VALUE OF THE \bar{i} PRICE LEVEL INDEX FOR THE PERIOD 2015–2019. SOURCE: EUROSTAT, OWN CALCULATION BY CAS TC

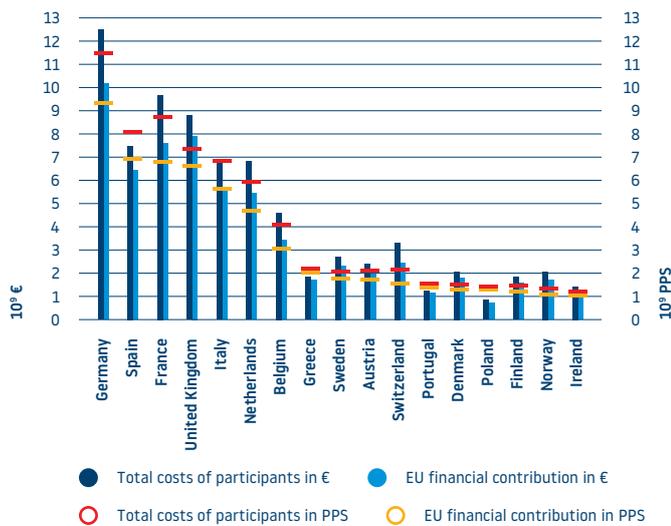


H2020: “EVERYTHING IS SOMEWHAT DIFFERENT”

At the level of absolute amounts expressed in € and in PPS, the countries compared do not, with some exceptions, show significant differences in their ranking (Figures 1 and 2). One of these exceptions is Spain, which ranks 4th in terms of nominal EU contribution to H2020, while in purchasing power standard it ranks 2nd, ahead of France and the United Kingdom. A similar statement applies to Poland (17th place in €, 14th place in PPS), Portugal (16th place in €, 12th place

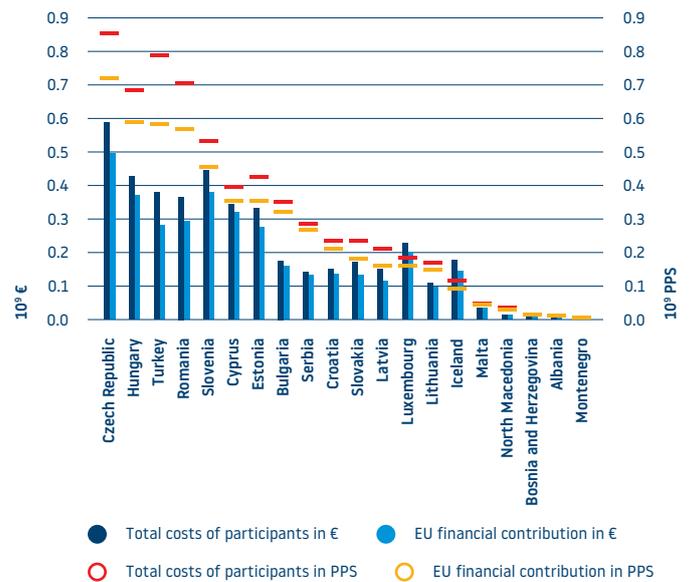
in PPS) or Greece (13th place in €, 8th place in PPS). On the contrary, Switzerland, for example, has the 8th highest contribution of the EU in nominal terms due to its high price level, but it falls to the 11th position in PPS. The same also applies to Norway. The Czech Republic ranks 18th in both expressions of the EU contribution.

FIGURE 1: COMPARISON OF THE RANKING OF COUNTRIES BY TOTAL COST OF PARTICIPANTS AND BY EU CONTRIBUTION TO PARTICIPANTS IN H2020 IN NOMINAL TERMS IN € AND IN PPS. FIGURE 1 SHOWS COUNTRIES WITH AN EU CONTRIBUTION OF MORE THAN PPS 1 BILLION. SOURCES: ECORDA (17.05.2022), EUROSTAT, OWN CALCULATION BY CAS TC



with a very high price level – Iceland ($\bar{i} = 1.52$; 258 thousand PPS/participation), Luxembourg ($\bar{i} = 1.24$; 276 thousand PPS/participation), Switzerland ($\bar{i} = 1.56$; 321 thousand PPS/participation) and Denmark ($\bar{i} = 1.35$; 345 thousand PPS/participation).

FIGURE 2: COMPARISON OF THE RANKING OF COUNTRIES BY TOTAL COST OF PARTICIPANTS AND BY EU CONTRIBUTION TO PARTICIPANTS IN H2020 IN NOMINAL TERMS IN € AND IN PPS. FIGURE 2 SHOWS COUNTRIES WITH AN EU CONTRIBUTION OF LESS THAN PPS 1 BILLION. SOURCES: ECORDA (17.05.2022), EUROSTAT, OWN CALCULATION BY CAS TC



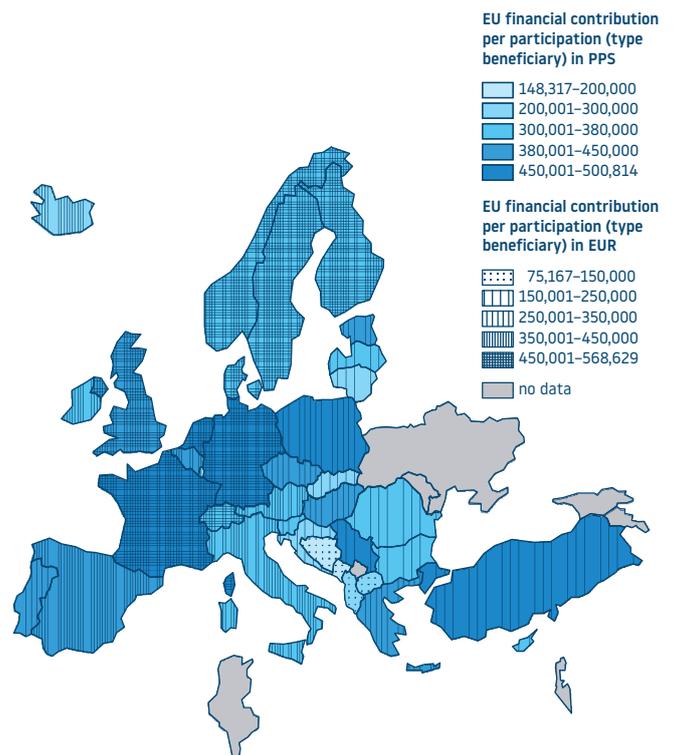
Much more interesting is the conversion of the EU contribution into 1 participation of a given state or group of states (Cartogram 2). The average value of the total cost of the projects was €524 thousand per 1 participation in H2020, the average value of the EU contribution per 1 participation was €430 thousand. In this representation, the Czech Republic reported a total cost of €350 thousand per 1 participation and an EU contribution of €294 thousand per 1 participation. In the case of the EU contribution expressed in this way, related to 1 participation, the Czech Republic ranked 21st among the monitored countries and 3rd among the new EU member states (after Cyprus and Estonia). Poland and Slovenia also had similar values for the EU contribution per 1 participation.

By contrast, Norway (€569,000), the Netherlands (€533,000), France (€527,000), Germany (€524,000) and Switzerland (€502,000) reported the highest values of the EU contribution per 1 participation.

If we express the value of the EU contribution to 1 participation in purchasing power standard, the ranking will change significantly, as many new EU Member States or countries associated with H2020 will come to the forefront. Turkey (with a value of $\bar{i} = 0.48$) with 501 thousand PPS per 1 participation and Serbia (with a value of $\bar{i} = 0.49$) with 489 thousand PPS per 1 participation, will rank 1st and 2nd. Poland is placed fourth ($\bar{i} = 0.59$; 477 thousand PPS/participation), the Czech Republic seventh ($\bar{i} = 0.69$; 426 thousand PPS/participation), Estonia eighth ($\bar{i} = 0.78$; 415 thousand PPS/participation) and Hungary tenth ($\bar{i} = 0.63$; 407 thousand PPS/participation). Thus, in purchasing power parity, these countries have EU contribution values per 1 participation similar to Germany ($\bar{i} = 1.09$; 482 thousand PPS/participation), France ($\bar{i} = 1.11$; 473 thousand PPS/participation) or the Netherlands ($\bar{i} = 1.14$; 466 thousand PPS/participation).

Despite the conversion to purchasing power parity, the associated countries of south-eastern Europe (Montenegro, Bosnia and Herzegovina, Albania, North Macedonia) maintain an unfavourable position. Of the new Member States this applies to Malta, Lithuania, Slovakia and Croatia. These countries report an EU contribution of less than 300 thousand PPS per 1 participation. Of the old Member States or developed associated countries, lower EU contribution values are those

CARTOGRAM 2: COMPARISON OF EU COUNTRIES AND ASSOCIATED COUNTRIES ACCORDING TO THE AMOUNT OF EU CONTRIBUTION IN H2020 PER 1 PARTICIPATION IN € AND PPS. SOURCES: ECORDA (17.05.2022), EUROSTAT, OWN CALCULATION BY CAS TC



Even with the division of participations by role (participant vs. coordinator), the above picture is preserved, moreover, it is even more pronounced. In the case of coordinators, the EU contribution for 1 participation higher than 1 million PPS was reported by Poland, Bulgaria, Latvia and Serbia. However, the last three countries mentioned coordinated dozens of projects. The Czech Republic ranked 5th among the monitored countries. Its coordinators in the H2020 programme reported EU support for 1 participation of 962 thousand PPS – similar to Germany (926 thousand PPS/participation), the Netherlands (906 thousand PPS/participation), Belgium (898 thousand PPS/participation) or France (854 thousand PPS/participation). Similar values were also recorded in Estonia (905 thousand PPS/participation), Hungary (888 thousand PPS/participation), Turkey (872 thousand PPS/participation) and Slovakia (823 thousand PPS/participation).

For ordinary project participants, the highest value of the EU contribution in PPS per 1 participation was reported by Serbia (416 thousand PPS/participation) and Turkey (413 thousand PPS/participation), followed by Poland (384 thousand PPS/participation) and Romania (353 thousand PPS/participation). By comparison, the EU contribution per 1 participation in the H2020 programme was 370 thousand PPS in Germany and 355 thousand PPS in France. The Czech Republic placed seventh with 344 thousand PPS per 1 participation.

A BRIEF COMPARISON WITH FP7

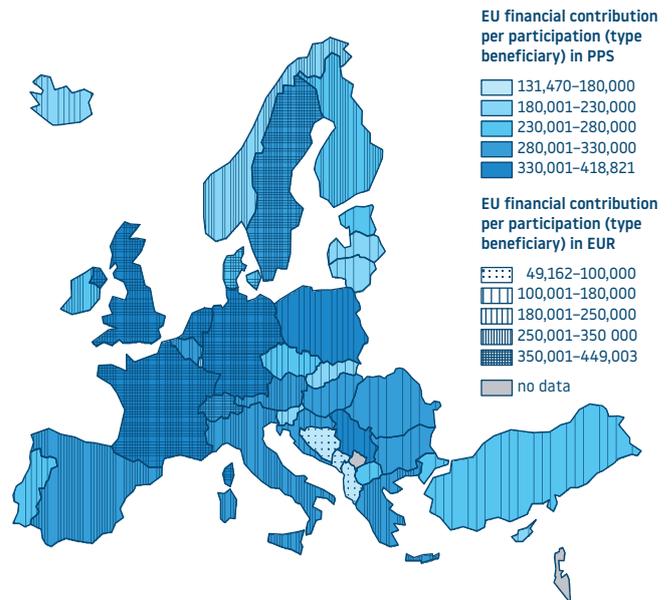
The ranking of countries according to the absolute amounts of the EU contribution expressed in € and PPS was essentially unchanged in FP7 and H2020, with a few exceptions. A significant positive exception was Spain (in € the shift from 6th place in FP7 to 4th place in H2020, in PPS the shift from 5th to 2nd place), followed by Portugal (in € the position remains, in PPS the shift from 15th to 12th place). Cyprus and Luxembourg also showed upward shifts in the rankings. On the other hand, significant negative exceptions were the United Kingdom (in € the position remains, in PPS a shift from 2nd place in FP7 to 4th place in H2020), Switzerland (in € the position remains, in PPS a shift from 8th to 11th place), from the new member countries Bulgaria (in € a shift from 23rd place to 26th place, in PPS a shift from 22nd to 25th place) and Hungary (in € and PPS a shift from 18th to 20th place). The Czech Republic maintains its position – in FP7 it received the 19th highest EU contribution nominally and in purchasing power parity, and the eighteenth in the H2020 programme.

If we convert the EU contribution into 1 participation, the ranking of countries in H2020 and FP7 is not stable. The average value of the total cost of FP7 projects was €473,000 per 1 participation, the average value of the EU contribution was €331,000 per 1 participation. In this statement, the Czech Republic reported a total cost of €333,000 per 1 participation (18th place) and an EU contribution of €197,000 per 1 participation (23rd place). Among the new EU member states, the Czech Republic was the first in the total cost of 1 participation, the fourth in the EU contribution to 1 participation (after Croatia, Cyprus and Poland, with Cyprus and Poland showing essentially the same values as the Czech Republic). The five countries with the highest values in € of EU contribution expressed per 1 participation are identical, with the exception of the United Kingdom and Norway in both FP7 and H2020.

When converting the EU contribution into 1 participation and purchasing power parity, the ranking of FP7 participating countries (Cartogram 3) is even more variable compared to H2020 (Cartogram 2). In the case of this indicator in H2020, the old Member States were represented 4 times in the top ten, while in FP7 5 times, plus Switzerland. For the new Member States, the position of Estonia (from 25th place in FP7 to 8th place in H2020), the Czech Republic (from 18th to 7th place) and Hungary (from 17th to 10th place) increased significantly in the EU contribution per 1 participation in terms of purchasing power parity. Of the associated countries, the same applies to Turkey (from 19th place in FP7 to 1st place in H2020). Serbia and Poland maintained their leading positions. On the other hand, Slovakia and Slovenia maintain their positions between 25th and 29th place in

both FP7 and H2020, as do Lithuania and Latvia (around 30th). On the contrary, Croatia and Bulgaria have fundamentally lost their positions – these countries have practically fallen through the entire ranking.

CARTOGRAM 3: COMPARISON OF EU COUNTRIES AND ASSOCIATED COUNTRIES ACCORDING TO THE AMOUNT OF EU CONTRIBUTION IN FP7 PER 1 PARTICIPATION IN € AND PPS. SOURCES: ECORDA (30.04.2021), EUROSTAT, OWN CALCULATION BY CAS TC



CONCLUSION

Given the different price levels in Europe, a significant difference in the way in which projects under the EU Framework Programmes for Research and Development are evaluated has been identified. The application of purchasing power parity can serve as an alternative view of how the Czech Republic is doing financially within these programmes. The example of the H2020 programme shows that financial indicators for the Czech Republic (and for a number of other new EU Member States) are not nearly as unfavourable as it seems when working only with nominal values. At the same time, it is possible to identify a positive trend in the growth of the number of participations and the acquisition of a higher amount of EU contribution at a lower price level in the Czech Republic and some of the new EU Member States.

The alternative view of the participation of the new member countries, including the Czech Republic, presented in this article thus raises a number of questions about the legitimacy of the demand by a number of representatives of these countries to equalize the level of personnel costs in FPs projects despite differences in countries' economic performance. Although the financial indicators presented in purchasing power parity can serve us well when comparing countries, at the same time it is necessary to respect the fact that they are more of "statistical constructs rather than precise measures" when working with them (European Commission 2012, p. 35). On the other hand, the reduction of distortions compared to nominal data, Eurostat's unifying calculation methodology and the key role of the purchasing power parity indicator within the framework of the financial relations of EU regional policy, has been regularly pointed out in the works, for example, of Mejstřík (2011, 2015), speak in favour of this approach.

When evaluating the participation of the Czech Republic in the FPs, it is also necessary to bear in mind that the purpose of participation in the FPs is not only to obtain funds per se or to remediate budgetary deficiencies in the regional, research and innovation policy of the

Czech Republic and the EU, but especially the international scientific and research cooperation necessary for solving challenges of a transnational nature and scope, including the accrual of scientific prestige resulting from it.

NOTES

¹eCorda – non-public database (full name External – Common Research Data Warehouse) managed by the Directorate-General for Research and Innovation of the European Commission (DG RTD). “This database in CSV format (from February 2021) is provided to selected groups of experts (EC employees, members of programme committees and authorized nationally nominated users of eCorda) usually 3 times a year in summary major editions and once each month in partial editions. The publication of data from this database is subject to the applicable ‘Confidentiality Rules for Framework Programme Data Stored in CORDA and eCorda’.

The eCorda database for H2020 exists in two forms – a database of grant agreements and participants (eCorda H2020 grant agreements and participants) and an eCorda database of project proposals and applicants. These two forms of database are independent of each other and the data in the database of project proposals and applicants are not retroactively modified according to reality, which may be the reason for a certain discrepancy of data in both databases.” (Frank 2021, p. 6). The basis for this contribution was the database of grant agreements and participants, which was made available by the EC on 17 May 2022.

²Horizon Dashboard – EC tool for internet interactive visualization of FP implementation data.
<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/horizon-dashboard>

³Associated countries to FP – ‘third countries which have concluded an international agreement with the European Union as referred to in Article 7 of Regulation No 1291/2013 [Horizon 2020]. These countries participate in the programme under the same conditions as EU member states. Legal entities from the associated countries can participate in the H2020 programme under the same conditions as legal entities from EU member states’ (Frank 2021, pp. 10–11). At the time of writing, 16 countries have been associated – Iceland, Norway, Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia, Turkey, Israel, Moldova, Switzerland, the Faroe Islands, Ukraine, Tunisia, Georgia, Armenia.
https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/international-cooperation_en.htm

⁴The so-called old ones are those EU Member States that were members before 1 May 2004 (i.e. Germany, France, Italy, the Netherlands, Belgium, Luxembourg, Ireland, Denmark, Greece, Spain, Portugal, Austria, Sweden and Finland). The so-called new Member States (also called “EU-13”) are those Member States that joined the EU on 1 May 2004 (the Czech Republic, Slovakia, Poland, Hungary, Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta), on 1 January 2007 (Romania and Bulgaria) or on 1 July 2013 (Croatia).

⁵The United Kingdom became a third country on 1 February 2020 under the EU-UK Withdrawal Agreement, which assumed that legal entities established in the United Kingdom remained fully eligible to participate in and receive funding from Horizon 2020 until its

closure in 2020. For this reason, the UK is considered an EU Member State in the eCorda database for the H2020 programme and is reported as such in all statistical surveys’ (Frank 2021, p. 11).

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