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HORIZON EUROPE: THE RHOMOLO EX-ANTE ASSESSMENT

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- In 2018 the European Commission has published its proposal for its future research and innovation (R&I) programme, Horizon Europe, a €100 billion programme that will succeed Horizon 2020.
- Horizon Europe is designed around three pillars: support researchers and projects (Open Science), pursue industrial leadership related to societal issues (Global challenges), and boost market-creating innovation (Open Innovation).
- The RHOMOLO dynamic CGE model has been used to estimate the ex-ante economic impact of Horizon Europe by simulating different policy scenarios.
- The analysis compares three alternative policy designs to a scenario without the policy: (1) *Continuation*, in which Horizon Europe is implemented similarly to the previous Horizon 2020; (2) *Centralisation*, in which the programme is reinforced by centralising at the EU level a third of the national competitive-based project funding; and (3) *Decentralisation*, in which the programme is implemented at the national level.
- The RHOMOLO simulations suggest that Horizon Europe can contribute to higher aggregate GDP and employment, with considerable potential regional heterogeneity.

1. Policy context

The ongoing European Commission's Horizon 2020 programme is the biggest EU R&I programme ever created with nearly €80 billion of funding available over the 2014-2020 programming period. Its main objective is to secure EU global competitiveness by driving economic growth and creating jobs. Innovation is widely recognised as an important driver of economic growth and Horizon 2020 aims at facilitating the production of world-class science, removing barriers to innovation, and making it easier for the public and private sectors to work together in delivering innovation.

In June 2018, the European Commission (2018a) has published a proposal for the establishment of Horizon Europe, the €100 billion programme that will succeed Horizon 2020 for the next programming period (2021-2027). The proposed programme uses a three-pillar structure, with each pillar interconnected with the others to strengthen the European research area.

The first pillar on Open Science aims at supporting excellent science through the European Research Council, Marie Sklodowska-Curie Actions, and research infrastructures. The second pillar on Global Challenges and Industrial Competitiveness tackles societal challenges (identified under five clusters: health, inclusive and secure society, digital and industry, climate, energy and mobility, and food and natural resources) and incentivises cross-disciplinary, cross-sectoral, and cross-policy and international collaboration. This pillar recognises the importance of reinforcing and maintaining the EU technological and industrial capacities in key areas related to innovation. Finally, the third pillar on Open Innovation focuses on scaling up breakthrough and market-creating innovation by establishing a European Innovation Council and continuing support to the European Institute of Innovation and Technology.

The European Commission's proposal has been accompanied by an ex-ante impact assessment in order to quantify the expected socio-economic effects of the policy. The European Commission's Joint Research Centre (JRC) is routinely involved in a number of impact assessment exercises. In this case, the dynamic spatial Computable General Equilibrium (CGE) model RHOMOLO has been used for the ex-ante evaluation of the Horizon Europe proposal. The RHOMOLO model is parametrized on 267 NUTS2 regions of the EU and has been developed by the JRC for territorial impact assessment (Lecca et al. 2018).

This Policy Insight refers to the assessment of the socio-economic impact of Horizon Europe which is explained fully in Christensen (2018). This Insight reports only its main features and results.

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2. The RHOMOLO simulations

Modern macroeconomic models such as RHOMOLO provide coherent and internally consistent frameworks to analyse the channels through which macroeconomic policies affect national and regional economies. In particular, RHOMOLO provides sector-, region- and time-specific results to support EU policy design and investment programs. The version of RHOMOLO used for this analysis covers all EU NUTS2 regions, each regional economy being disaggregated into ten economic sectors.

Three different policy designs have been analysed with the RHOMOLO model, in all cases compared to a baseline scenario in which the discontinuation of the EU R&I programme was assumed. Thus, all the results reported in the following section must be read as compared to a situation with no EU policy in place, and in which EU Member States (MS) will use the resources which would be devoted to Horizon Europe for investment purposes (including - but not exclusively – supporting national R&I investments).

The scenarios were identified by SEURECO (2018) and contained €70 billion of public spending, which is less than the actual proposed budget for Horizon Europe of €100 billion.
The scenarios are the following:
• *Continuation scenario*. EU R&I programme continues similarly to Horizon 2020 until 2027;
• *Centralisation scenario*. From 2021 onwards the EU R&I programme is reinforced compared to Horizon 2020 by centralising at the EU level a third of the national competitive-based project funding;
• *Decentralisation scenario*. EU R&I programme is implemented at the national level. Hence, each MS spends a similar amount to the previous Horizon 2020 in support for national R&I activities.

Two channels are considered in RHOMOLO, namely the demand channel and the productivity channel. The former appraises the effects of the rise in public spending in support to R&I, with consequences both on private and public investments. On the other hand, the productivity channel has to do with the knowledge accumulation generated by the R&I investments, with long-term effects on economic growth. Moreover, a second set of simulations has been performed in which the productivity effects from R&I spending within RHOMOLO were re-scaled in order to match the impact assessment carried out by SEURECO using a different economic model, namely the NEMESIS model.

The policy impact of this research

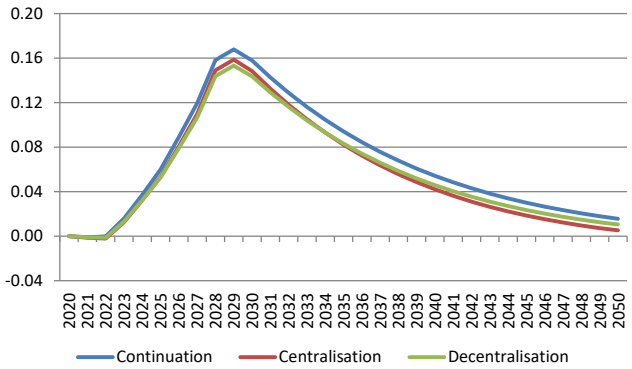
The results of this analysis are featured in the Impact Assessment accompanying the proposal of the European Parliament and of the Council establishing Horizon Europe - the Framework Programme for research and innovation, laying down its rules for participation and dissemination - published on the 7th of June 2018 by the European Commission (2018b).

3. Main results

Figure 1 shows the change in EU GDP relative to the reference scenario for the three alternative policy designs. In all scenarios there is a gradual rise in EU GDP peaking in 2029, two years after the end of the programming period. The highest impact is recorded under the Continuation scenario, with EU GDP in 2029 being 0.17% higher than in the reference scenario, while the lowest impact is associated with the Decentralisation scenario (with a +0.15% change with respect to the reference scenario).

It is worth repeating that the analysis was carried out assuming a budget of €70 billion, but if the final agreement on the new Horizon Europe budget will lead to a higher figure (for instance, around €100 billion as indicated by the proposal of the European Commission, 2018a), the assessment reported here should be treated as an underestimation of the potential impact of the policy.

Figure 1: EU GDP impact of the three policy options (% change relative to the reference scenario)



The gradual rise in EU GDP is mainly caused by higher productivity growth due to higher R&I investments. These effects refer to the period under consideration for this specific programme – that is the Multi-Annual Financial Framework 2021-2027 (after which the

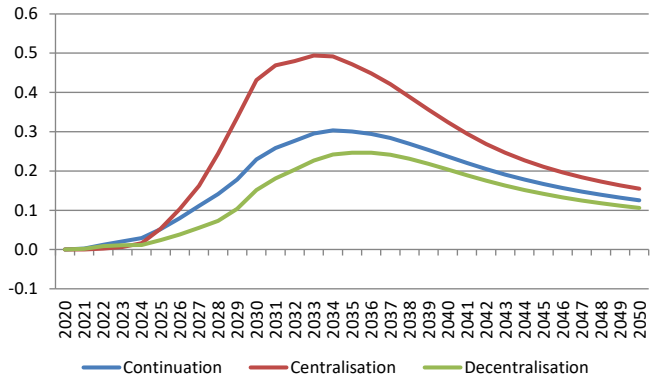
public R&I support programme stops). As such, in the longer run, GDP impacts under any scenario are mainly due to changes in productivity and tend to fade out over time.

In the RHOMOLO model, the efficiency gain stemming from the accumulated knowledge stock is assumed to disappear gradually over time in order to account for obsolescence of the innovations created in the past. This implies that the productivity gains caused by R&I investments made in the past gradually die out.

Why is the economic impact of Horizon Europe higher under the *Continuation* scenario? In the *Centralisation* scenario, resources are shifted from national R&I support towards the EU R&I programme, resulting in a shift of funding from some of the most R&I intensive regions to less R&I intensive regions. In RHOMOLO, such a shift in public funding results in a small reduction in productivity growth compared to the *Continuation* scenario, thus explaining the bigger impact of the policy under the *Continuation* scenario.

The outcome is different when looking at the set of simulations carried out by harmonising the productivity effects with those estimated by SEURECO with the NEMESIS model. Figure 2 reports the GDP impact of the three policy designs after having performed the productivity re-scale within RHOMOLO.

Figure 2: EU GDP impact of the three policy options (% change relative to the reference scenario) - re-scaled productivity effects



In this case, the biggest economic impact is obtained under the *Centralisation* scenario because the NEMESIS model implies higher productivity of R&I carried out at the EU level compared to the investments performed nationally. Coherently with this framework, reinforcing the EU R&I programme will results in higher economic growth.

This difference in the results highlights the importance of using various approaches for the ex-ante evaluation of policies. The magnitude and the time profile of the economic effects of a policy are hard to estimate, and carrying out impact assessment with alternative models and under different assumptions provides for more robust evidence, essentially yielding some sensitivity analysis in the process.

4. Conclusions

The RHOMOLO analysis summed up in this Policy Insight concludes that Horizon Europe is likely to contribute positively to EU GDP and productivity, with different results depending on the exact design of the policy.

The full analysis exploring more aspects related to the impact assessment of the policy is reported in Christensen (2018).

This policy insight does not discuss the territorial implications of the policy. However, available evidence on previous R&I programmes such as Horizon 2020 and the Framework Programmes suggests that the most R&I intensive regions are able to attract a large proportion of funding[1] and therefore benefit the most in terms of GDP and productivity enhancements.

How to cite:

Christensen, M., Conte, A., and Salotti, S. (2019). Horizon Europe: The RHOMOLO ex-ante assessment. Territorial Development Insights Series, JRC115437, European Commission.

[1] See http://s3platform.jrc.ec.europa.eu/synergies-tool

Read more

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