



Repair & Prepare | May 2021

## Europe seen from the stars How EU funding policy works locally

**Our examination of 119,116 EU-funded projects in 6571 municipalities in Germany, Poland and the Czech Republic shows that those receiving more EU funding grow more strongly and, ultimately, catch up economically. We break new methodological ground in the process by making use of night light emission data from satellite imagery to establish these effects.**

### Local Europe – seen but unmeasured

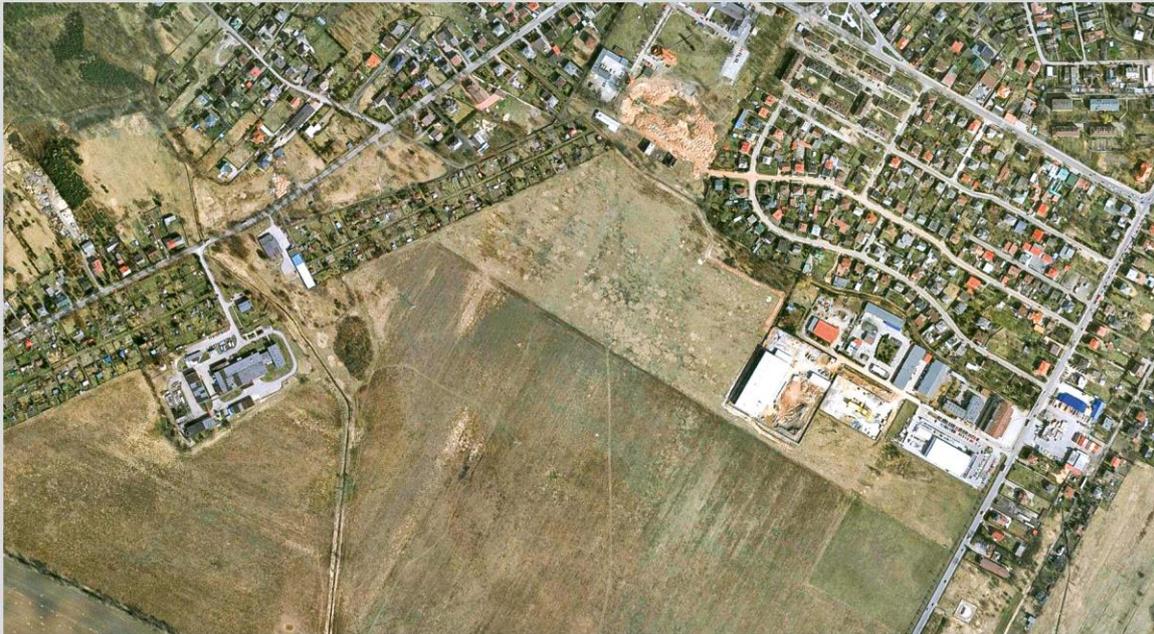
Most Europeans have seen a building, road or bridge being built as part of EU-funded projects and festooned with banners or plaques bearing the European flag. One such project is the 8-kilometre bypass in Myszków, a municipality in the region of Silesia in Poland, that was built between March 2016 and September 2018. Before construction, it took a disordinate amount of time to reach the nearest large city, Katowice, because there were no trunk roads. The new bypass improved the municipality's links to the country's long-distance transport network. Construction was supported by 83% (or 17.4 million euros) from the EU through the European Regional Development Fund (ERDF). The road

also opened up a new industrial and commercial area where regional and supra-regional companies with about 200 employees have already settled. Satellite images of the road under construction, as shown in Figure 1, highlight the expansion of the regional infrastructure.

Ideally, infrastructures newly built within the framework of EU funding should lead to more economic activity in the respective city, municipality or even entire region, as we saw in Myszków. However, effects that are partially visible with the naked eye and/or known to local residents are difficult to measure and evaluate economically within a larger context. There is no consistent, EU-wide monitoring of regional funding at municipal level.

FIGURE 1 Bypass and industrial area

Aerial view of Myszków, Poland, 2013 and 2018



1st October 2013



30th August 2018

Source: Upper image: Google Earth, Image Landsat / Copernicus. Bottom image: Google Earth, Image c 2021 CNES / Airbus

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How effectively are the resources of the European structural and cohesion funds distributed? Are they achieving their goals? And how does EU funding policy work locally? These questions are highly relevant given the scale of funding and the political controversy that regularly surrounds them in the EU. We looked into them for the last two periods of the EU Budget or Multiannual Financial Framework (MFF) 2007-2013 and 2014-2020, choosing a

pilot region on the borders of Germany, Poland and the Czech Republic.

### **Structural and cohesion policy as key element of EU spending**

Strengthening economic, social and territorial cohesion and redressing regional imbalances are core tasks of the European Union and are

enshrined in the EU Treaties (Art. 174-176 TFEU). A large part of the Multiannual Financial Framework (MFF) is therefore traditionally allocated to the EU's structural and cohesion funds. In the last MFF 2014-2020, about one third of the EU budget (around €355 billion) was spent on cohesion policy. In the new MFF 2021-2027, around €330 billion, again about a third of total spending, is earmarked for structural and cohesion funds. In addition, another €47 billion (via REACT-EU) is available specifically for cohesion policy through the "Next Generation EU" instrument to promote recovery from the coronavirus crisis. These amounts are primarily intended to give Europe's structurally weaker regions the opportunity to develop, for example through better infrastructural networks, and to catch up on economically stronger regions. The EU's regional funding takes place primarily through the MFF's structural and cohesion funds. These are the European Social Fund, the Cohesion Fund and, above all, the European Regional Development Fund (ERDF), which accounts for almost two thirds (around 200 billion euros in the MFF 2021-2027) of EU cohesion spending.

The basis for structural and cohesion funding under the MFF 2007-2013 was the Lisbon Strategy of 2000, which was designed to increase growth, competitiveness and employment. Cohesion policy was meant to achieve three goals: (1) promoting economic convergence so as to equalize the growing differences in living standards that had arisen primarily as a result of the EU's eastward expansion; (2) fostering regional competitiveness and employment in the single market<sup>1</sup>; and (3) improving territorial cooperation in terms of stronger cross-border networking of economic areas. In 2010, the Europe 2020 Strategy was launched as a follow-up to the Lisbon Strategy. It should ensure intelligent, sustainable and

inclusive growth by 2020. The background here was new economic and social challenges such as climate change, the aftermath of the financial crisis and demographic change. The core objectives were to increase employment, raise spending on research and development, mitigate global warming, improve education and reduce poverty and social exclusion.

How these over-arching EU goals are met concretely in the respective member states and regions of Europe is determined by national and, in some cases, regional reform and funding programs. Both the content of these programs and their organizational implementation can differ between the member states. In Poland, for example, a predominant proportion of the funding goes to national infrastructure projects, while in the Czech Republic just as much money goes to regional projects and projects to promote business and innovation. Federal state structures such as in Germany lead to decentralized management and implementation of EU-funded projects, whereas in centrally organized countries such as the Czech Republic they are controlled at national level.

## Satellite images as a basis for assessing European funding policy

Despite numerous studies measuring the growth effects of EU funding policy<sup>2</sup>, there is no uniform, EU-wide monitoring and evaluation of EU public spending at the municipality level. For one thing, there is no comprehensive list of all European funding projects, amounts and beneficiaries at that level. In addition, the common indicators for measuring growth and development, such as GDP, are not available for tiny spatial units. Therefore, earlier studies are often limited to the country level or – in some cases – that of NUTS2 or NUTS3 regions.<sup>3</sup> Moreover, other factors

<sup>1</sup> See e.g. Jensen, J. B. & Naess-Schmidt, S. (2018). Subsidiarity and Proportionality in the Single Market. Bertelsmann Stiftung. Available here: [Publication \(bertelsmann-stiftung.de\)](https://www.bertelsmann-stiftung.de)

<sup>2</sup> See e.g. Cerqua, A. & Pellegrini, G. (2018). Are we spending too much to grow? The case of Structural Funds. *Journal of Regional Science*, 58(3), 535-563. For a full

literature overview see our study "Evaluating EU cohesion policy using satellite data".

<sup>3</sup> NUTS (Nomenclature des unités territoriales statistiques) is a system for identifying and classifying spatial reference units in the EU. As a rule, a NUTS level corresponds to an administrative level. NUTS0 (member state) > NUTS1 (major regions/states) > NUTS2 (basic regions/states) > NUTS3

besides EU funding policy play a role in a region's development, such as regional and national administrative capacities and policy decisions, as well as external factors and global (economic) events. This makes a precise evaluation of European funding policy difficult.

To overcome these problems, we developed an innovative research design for a pilot region in the border area of Germany, Poland and the Czech Republic<sup>4</sup> together with a research consortium consisting of the German Aerospace Centre (DLR), the Austrian Institute of Economic Research (WIFO), the Institute for Economic Research in Munich (ifo) and the Institute for Regional and Urban Development Research (ILS). In a first step, a project database was created which, thanks to its level of detail, makes it possible to precisely allocate EU-funded projects and amounts very precisely at the municipality level (Local Administrative Unit, LAU). For the pilot region, this means 6571 municipalities instead of 102 NUTS3 regions and thus leads to significantly more precise localization and subsequent impact assessment of EU funding. The second step was to use high-resolution satellite imagery for the analysis of our pilot region's development. On the one hand, with the help of satellite images it is possible to see directly where and when which infrastructure has been built (see Figure 1). On the other, satellite data record not only surface changes but also night-time light emissions, enabling one to draw conclusions about the economic activity of a municipality. It is common in economic research to use nocturnal light emissions as a proxy for economic growth. Especially in less developed countries, this method is often used due to the lack of consistent economic data. Recognized studies have shown that night light development and (economic) growth are positively related.<sup>5</sup>

## Large differences in funding distribution

First of all, we determined how EU funding is distributed within the pilot region. Figures 2 and 3 show the distribution of funding amounts and projects in the municipalities of the pilot region for the MFF periods 2007-2013 and 2014-2020. Many municipalities in Poland and the Czech Republic enjoy elevated funding amounts per 1,000 inhabitants. Eastern German municipalities also benefited from funding during the periods under review, but to a much lesser extent.<sup>6</sup> With regard to the number of projects, Czech municipalities are in the lead, but also northern German municipalities in Mecklenburg-Western Pomerania. This indicates that there were fewer, but more cost-intensive projects in Poland than in the German and Czech municipalities.

What's more and in the main, municipalities in the pilot region received more funding when they already had high night-time light emissions – i.e. economic activity – in relative terms in 2007. This is because ERDF funding, often directed towards productive investments and business support as well as research and development and innovation, mainly flows to areas where a certain (commercial) infrastructure is already in place.

Overall, both the funding amounts and the number of projects decreased in the second funding period (2014-2020) compared to the first (2007-2013), as the pilot region developed positively in this timeframe and thus individual areas (e.g. in Eastern Germany) fell out of cohesion funding in the second phase.

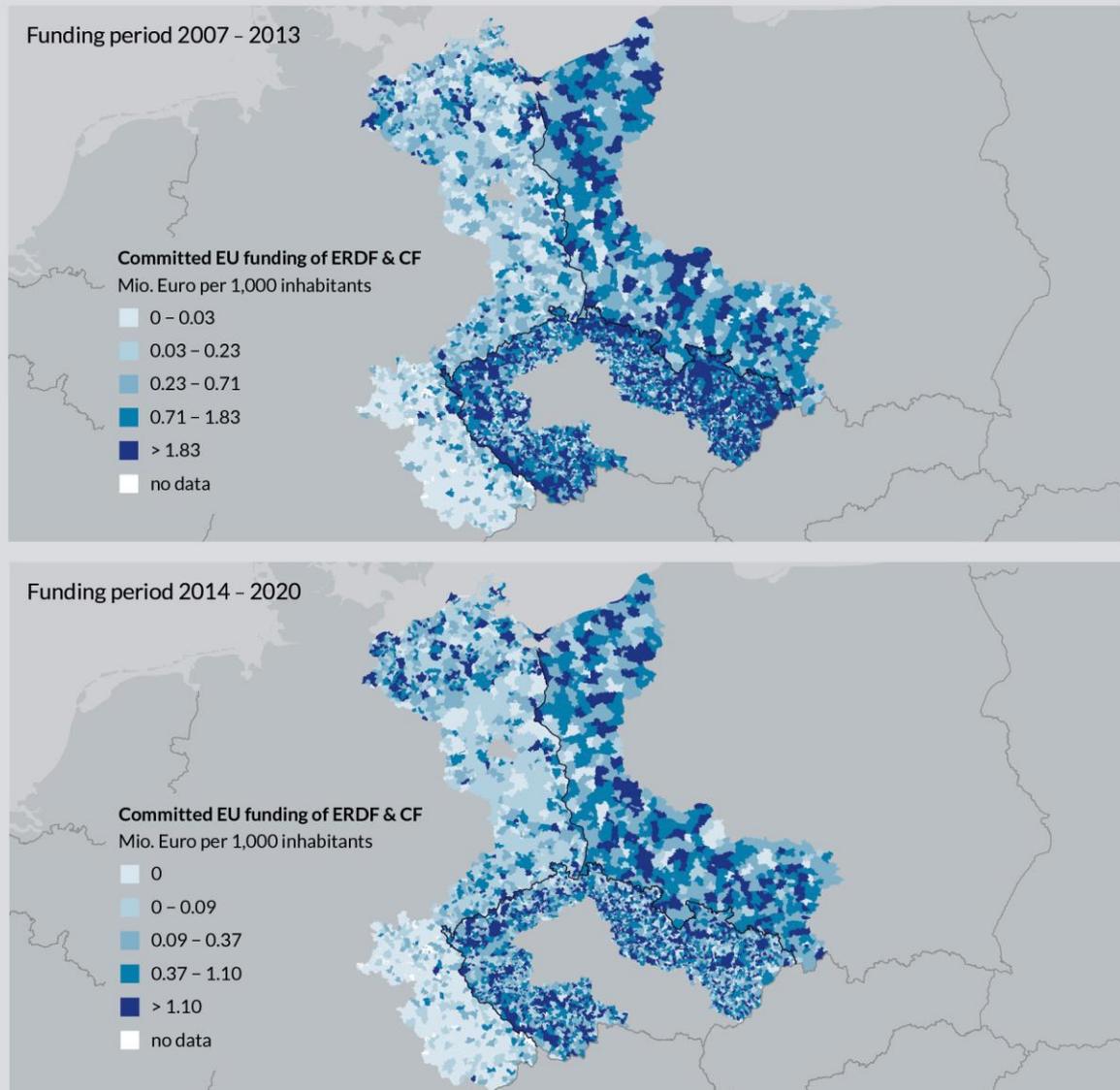
(small regions/counties/districts) > LAU (Local Administrative Unit, municipality or commune).

<sup>4</sup> These include the following NUTS2 regions: in the Czech Republic = Jihozápad (Southwest), Severozápad (Northwest), Severovýchod (Northeast), Central Moravia, Moravian Silesia; in Germany = Lower Bavaria, Upper Palatinate, Upper Franconia, Brandenburg, Mecklenburg-Western Pomerania, Dresden, Chemnitz; in Poland = Silesia, Western Pomerania, Lubusz, Lower Silesia, Opole. See also Figures 2-3.

<sup>5</sup> See Donaldson, D. & Storeygard, A. (2016). The view from above: Applications of satellite data in economics. *Journal of Economic Perspectives*, 30(4), 171-98.

<sup>6</sup> Berlin was not considered. With its border to the Czech Republic, Bavaria is part of the pilot region. However, due to its above-average economic development, its municipalities receive (almost) no funding.

FIGURE 2 Funding amounts of selected EU regional funds per 1,000 inhabitants and municipality



Source: Own representation. © EuroGeographics for the administrative units. Selected municipalities in DE, PL, CZ; ERDF = European Regional Development Fund; CF = Cohesion Fund

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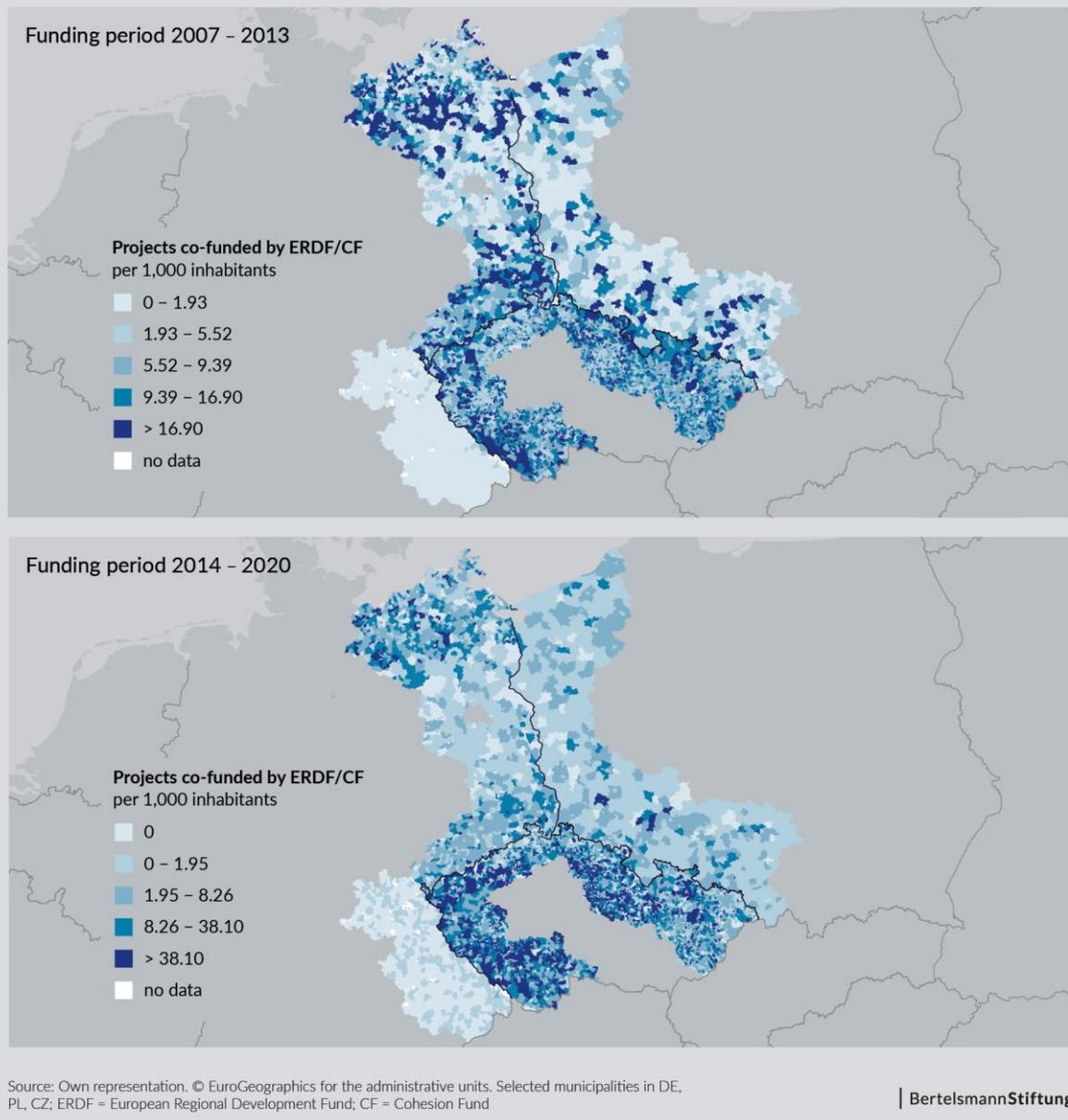
## Economic analysis shows positive correlation between EU funding and growth

What influence does EU funding policy have on the economic activity and growth of European municipalities? For this purpose, we evaluated the relationship between the development of night-time light emissions and the amount of EU funding as well as the number of EU-funded projects, using quantitative methods. The selected pilot region belongs for the most part to the structurally weaker regions of Europe. Poland received the highest funding amounts in absolute terms from the MFFs 2007-2013 and

2014-2020, whereas the Czech Republic had the highest per capita funding in 2007-2013. In addition, the satellite data availability for our pilot region is very good. In terms of funding, we focused on the European Regional Development Fund (ERDF) with its interregional projects and the Cohesion Fund.

Overall, the analysis shows that EU funding amounts are positively related to the change in nocturnal light emission. This effect takes on a value of up to 0.0116 depending on the period considered and the model specification. This means that a 1% increase in EU funding, all other factors being equal, was on average associated with an increased growth in night-

FIGURE 3 Number of selected EU-funded projects per 1,000 inhabitants and municipality



time light emissions of up to 0.0116% in the municipalities considered. If one assumes the same correlation between night light growth and GDP growth at the municipal level as at the NUTS3 level, this corresponds to higher growth of around 0.001%. The EU funding policy thus shows a measurable, positive – albeit very low – correlation with economic growth at the municipality level in our pilot region.

The effect is also positive for the correlation between night-time light emissions and the number of EU-funded projects. One additional EU-funded project per municipality is on average associated with increased night-time light growth of up to 0.09% or increased economic growth of

up to 0.008%. However, this relationship is less precise as there is no differentiation between large and small projects. This suggests that the intensity of spending is more important than the number of projects.

### Convergence, spillover effects and heterogeneities

As already mentioned, the goal of EU regional funding is first and foremost an overall increase in (economic) growth in structurally weaker regions. This comes with other factors such as enhanced employment, competitiveness and living standards. However, especially in the

funding period 2007-2013, the convergence objective, i.e. catching up on economically stronger regions, also played a decisive role. When examining the correlation between the development of night-time light emissions and the initial level of nocturnal light in 2007, we found that municipalities with a lower starting level of emissions grew more strongly than municipalities with an initially higher level. This can be observed at national, NUTS2 as well as NUTS3 levels in both funding periods. Thus, our chosen municipalities in the pilot region have converged economically over time.

We can also see that there is a positive relationship between economic development in a municipality and EU funding in neighboring municipalities. This means that EU funding not only benefits the directly funded commune, but also those in the immediate surrounding area and can thus trigger spillover effects. This has important policy implications as external players can benefit from own region-specific efforts.

Finally, we tested the positive effect between EU funding and regional economic growth for possible heterogeneities. In a country-by-country comparison, we found that the funding effect was strongest for the Czech communes. Looking at the different funding objectives, the strongest positive effects could be found in the areas of research and development and innovation, productive investment and business support, plus environmental infrastructure. The final two are obvious, as they reflect projects that by and large visibly mark the earth's surface and are thus picked up in satellite images.

## **Conclusion: Europe matters in our pilot region**

Using an innovative analytical approach based on satellite data and detailed information on EU funding at the municipal level, we were able to show that there is a positive and measurable relationship between EU regional policy and economic growth. For the last two Multiannual Financial Frameworks 2007-2013 and 2014-2020, we examined EU funding levels and projects within municipalities located in our pilot region on the borders of Germany, Poland and

the Czech Republic. The analysis of related satellite data, especially night-time light emissions, revealed that infrastructural changes and economic growth in the pilot region occurred mainly in municipalities that enjoyed greater EU funding.

The coronavirus crisis has led to severe economic downturn in many EU member states, further exacerbating (regional) inequalities. Strengthening cohesion and solidarity in Europe is therefore more important than ever. The negotiations on the Multiannual Financial Framework 2021-2027 and on the recovery instrument "Next Generation EU" have shown that setting priorities and controlling payments can be a great source of conflict. This can impede necessary funding measures. As part of our work, we have succeeded in shedding some light on how EU funding can impact a selected pilot region.

Both our detailed EU funding database at the municipal level and our innovative analytical approach based on satellite data analysis provide a good starting point for further research and carry over into a European-wide tool for monitoring EU public spending. Data-based analyses such as the one carried out here can underpin debates on EU spending policy with greater empirical evidence and, building on this, help develop a more tailored EU cohesion and structural policy.

## About the project

Within the “Europe’s Future” program, the project “Repair and Prepare: Strengthening Europe” delivers ideas and analyses for a stronger European economy.

The interdisciplinary module “Europe seen from the stars” uses satellite data to evaluate how EU funding (structural and cohesion funds) in the periods 2007-2013 and 2014-2020 has affected infrastructural changes and economic growth in a pilot region containing municipalities in Germany, Poland and the Czech Republic. A further component is a qualitative case study evaluation, which allows to get an impression of the concrete development of the local economic situation.

You can find more information here:

[www.bertelsmann-stiftung.de/repair-prepare-en/](http://www.bertelsmann-stiftung.de/repair-prepare-en/)

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