Does Cohesion Policy help to combat intra-country regional disparities? A perspective on Central European countries

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ABSTRACT
This paper analyses the effect of the macroeconomic efficiency of Cohesion Policy on within-country economic cohesion as reflected by various measures of sigma convergence by applying macroeconomic HERMIN models for the Czech, Polish and Slovak regions. The results reveal that from 2021 to 2027, Cohesion Policy will have a relatively small impact on within-country convergence. More importantly, Cohesion Policy seems to be doomed to fail in terms of reducing within-country disparities in the long run; that is, the structural differences among regional economies effectively prevent European Union support from narrowing the development gap between regions.

KEYWORDS
regional convergence; Cohesion Policy; macroeconomic modelling; policy impact

INTRODUCTION
Although Cohesion Policy (CP) has evolved considerably over time to support the competitiveness of all European Union (EU) regions within a place-based framework (Barca, 2009; Organisation for Economic Co-operation and Development (OECD), 2009; Barca et al., 2012), the majority share of its allocation is still intended to stimulate lagging regions and, consequently, cohesion in the EU. Specifically, CP funding supports new member states in their pursuit of catching up to more affluent EU countries. Notably, some Central and Eastern European (CEE) regions receive substantial EU support to catch up. From a macroeconomic perspective, the extent to which that catch up is achieved is often evaluated by considering economic convergence.

When analysing economic disparities, two perspectives are usually applied, that is, inter-national and intra-country (within-country). The latter seems to be of growing importance. As is clearly shown by Monfort (2020), within-country disparities exhibited a growing tendency starting in 2004, reaching the level of 66% of total regional discrepancies in the EU in 2017. Addressing within-country differences is thus crucial for mitigating overall interregional disparities across the EU, which is an obligation for policymaking as established by the Treaty of Rome. In addition, territorial inequality within a specific country seems to be a more relevant societal benchmark than the EU average (Monfort, 2020). Hence, greater intra-country disparities give rise to a geography of discontent, that is, people’s territory-related dissatisfaction leading to despair and populism (Farole et al., 2018; Rajan, 2019; Rodríguez-Pose, 2018). In turn, this is likely to undermine the foundations of long-term development and potentially to be a threat to democracy.
The EU’s CP effectively contributes to improving the economic performance of the CEE regions (e.g., Lecca et al., 2019) and thus triggers economic convergence at the country level (e.g., Zaleski et al., 2016). However, the literature on the impact of CP on within-country disparities is scarce and inconclusive. With that in mind, this study focuses on the role of CP in determining within-country economic disparities as measured by sigma convergence. The process of convergence is assessed from the perspective of long-term CP efficiency, that is, the rate of return on EU funding obtained through the stimulation of the supply side of the economy. Macroeconomic efficiency is measured using cumulative multipliers and computed by dividing the cumulative percentage increase in the level of gross domestic product (GDP) by the cumulative spending (implementation) of CP funds (Bradley & Untiedt, 2010). In other words, the measure shows how much the GDP (as measured in euros) is generated with €1 of CP support. This calculation has two main advantages when analysing the effects of CP: first, greater comparability of the effects among regions with different CP support; and second, and more importantly, the ability to compare and contrast the role of inherent economic structural differences in determining the efficiency of the CP interventions.

As the countries that joined the EU in 2004 mostly comprise regions with great deficits in terms of infrastructure, physical and human capital, and research and development (R&D) capacity, the expected effects of CP should be clearly visible. To this end, macroeconomic HERMIN models were applied for the NUTS-2 regions in Poland, the Czech Republic and Slovakia. The simulations were conducted for the 2021–29 period using projections of 2021–27 CP support based on the spatial and temporal allocation of the previous programming period. The utilization of macroeconomic modelling in our study allows us to effectively explore the complexity of the mechanisms through which CP impacts are channelled. An applied framework takes into account the interdependencies and feedback among different sectors and dimensions of the economic system. Consequently, a wide range of spillover effects and externality mechanisms are inherently embedded in the structures of macroeconomic models. Importantly, it integrates, with significant value added, reduced-form single-equation econometric models (e.g., Rodríguez-Pose & Fratesi, 2004; Breidenbach et al., 2016) and more recent counterfactual techniques (e.g., Becker et al., 2010, 2012; Pellegrini et al., 2013; Crescenzi & Giua, 2020).

This paper contributes to the existing literature by showing the macro-model-based CP impacts on within-country convergence and providing an in-depth analysis of CP macroeconomic efficiency as a driving force behind the impact of EU support on regional disparities. To this end, HERMIN models of regional economies belonging to different CEE countries are used for the first time. The results reveal that the CP impact mechanisms make it impossible not only to trigger convergence but also to effectively reduce within-country divergence. Those findings are the first contribution obtained by leveraging the macroeconomic modelling framework to the debate initialized by Crescenzì et al. (2020) about the importance of local (regional) characteristics in shaping the benefits of policies—in our case, CP.

The remainder of the paper is structured as follows. The next section provides a brief overview of the previous studies of CP impact on intra-country convergence and CP efficiency. The main structural features of the applied HERMIN modelling framework and data are then described. Subsequently, the results are presented and discussed. The paper concludes by highlighting the key findings and their policy implications.

REGIONAL CONVERGENCE AND THE EFFECTS OF COHESION POLICY

Unlike the impact of CP on inter-country convergence (for a review, see, e.g., Hagen & Mohl, 2009; and Montfort, 2009), the literature on the effects of CP on intra-country sigma convergence is fairly scant and inconclusive. For instance, Kyriacou and Roca-Sagalés (2012) assess the CP impact (mainly focusing on support for physical infrastructure) on NUTS-2 regional disparities within EU-15 countries over the period 1995–2006. Their results show the positive impact of EU support on sigma convergence. However, this effect reverses above some level of EU funding intensity, that is, approximately 1.6 of country-level GDP. In addition, De la Fuente (2003) points to the positive effects of the 1994–99 Community Support Framework for Objective 1 Spanish regions. The results suggest that 20% of the initial gap in income per capita between the regions under consideration and the rest of Spain was reduced due to EU support. The contribution of CP to the stimulation of intra-country convergence is revealed by Eggert et al. (2007), who investigate EU intervention in 16 German NUTS-1 regions from 1989 to 1999, and Soukiazis and Antunes (2006), who analyse the impact of CP on 30 NUTS-3 Portuguese regions over the period 1991–99.

Another strand of research studies shows fairly negligible CP impacts on regional disparities within EU countries, or none at all. Specifically, de la Fuente et al. (1995) point to the weak impact of the European Regional Development Fund on NUTS-2 regional disparities in Spain over the period 1985–91. Similar insights are provided by Arcalean et al. (2007) for Portugal. Moreover, no significant impact of CP on within-country regional disparities is found in Ederveen et al. (2002) or Garcia and McGuire (2001). Bourdin (2019) argues about the capacity of EU funds to reverse agglomeration tendencies and selective growth dynamics.

The aforementioned research studies were largely based on reduced-form single-equation econometric models. To the best of our knowledge, macroeconomic modelling has not been directly used to evaluate the impact of CP on intra-country economic disparities as measured by sigma convergence indicators. The use of macroeconomic models has been largely limited to
highlighting the quantitative effects of EU intervention, as reflected by changes in a narrow selection of macroeconomic indicators such as output, employment or labour productivity. The dominant role in the macroeconomic impact analysis of CP at the regional level has been played so far by two research tools: HERMIN and RHOMOLO. The former methodology was implemented for Polish, Slovak and Czech regions as well as the Mezzogiorno (Italy) and Eastern Germany (e.g., Bradley & Untiedt, 2002; Hallet & Untiedt, 2001; Radvanský et al., 2016; Zaleski et al., 2016). The latter was applied at the level of the EU NUTS-2 regions (e.g., Di Comite et al., 2018; Lecca et al., 2019).

In macroeconomic model-based analyses of the impact of CP, attention is sometimes placed upon cumulative multipliers as measures of CP efficiency. For instance, in Varga and in ‘t Veld (2009), 2000–06 CP cumulative multipliers are computed using the QUEST model. Their values for 2020 range from 1.96 (Italy) to 6.13 (Latvia). The highest values are reported for new member states and previous cohesion countries (Spain, Portugal, Greece and Ireland). Likewise, Bradley and Untiedt (2009) seem to confirm the most beneficial positions of the new member states, Ireland and Spain in terms of the efficiency of CP from 2000 to 2006. The HERMIN model-based cumulative multipliers range from 1.07 (Germany) to 4.22 (Ireland) for 2020. More importantly, Bradley and Untiedt (2009, 2010) offer an interpretation for the differences in the cumulative multipliers among countries. They point to the following structural factors as the driving force behind macroeconomic efficiency of EU funding: the share of manufacturing in total GDP (positive impact); the degree of openness of the economy as measured by the ratio of exports and imports to the GDP (positive impact); the rate of technical progress (positive impact); and the effects of greater labour productivity on wages, that is, the wage bargaining mechanisms (negative impact). Moreover, Bradley and Untiedt (2009) point to the complexity of the analysis of the efficiency of CP as measured by cumulative multipliers.

It is also worth mentioning research studies using the RHOMOLO modelling framework because they present the efficiency of CP at the NUTS-2 regional level. Di Comite et al. (2018), for instance, report maximum values of 2007–13 CP cumulative multipliers (6.5) for two Spanish regions (Comunidad Foral de Navarra and Comunidad de Madrid) and one Irish region (Southern and Eastern). A large number of EU regions are characterized by cumulative multipliers fluctuating around the value of 2.0. Moreover, the authors point to the character of the EU budget contribution, that is, whether a country is a net receiver or net contributor; labour intensity and the extent of export orientation as the key drivers determining the macroeconomic efficiency of EU funding. Importantly, it is clearly shown that interregional relations have a strong positive effect on the values of cumulative multipliers. There are also other reports presenting CP cumulative multipliers (e.g., Gakova et al., 2009; Monfort, 2012). It seems, however, that cumulative multipliers are merely used in these studies to ensure the comparability of the impact across countries or regions.

**METHODOLOGY AND DATA**

**Main structural features of HERMIN models**

An applied methodology is well documented by Bradley and Untiedt (2010), Radvanský et al. (2016) and Zaleski et al. (2016). The original framework of a HERMIN regional model focuses on key structural features of an economy, and in this type of model the following aspects are important (Bradley et al., 2017):

- The relative sizes and features of both externally traded and non-externally traded sectors and their development, production technology and structural changes.
- The degree of economic openness, exposure to trade with the external world, and response to external and internal shocks.
- The functioning and flexibility of labour markets considering the possible role of international and interregional labour migration.
- The role of the public sector and interactions between public and private sector trade-offs in public policies.
- The mechanisms of wage and price determination.
- In a national HERMIN model, one would have to include monetary aspects, but these can be taken as exogenous at the regional level (i.e., they are determined at the national level).

The HERMIN-based regional framework considers five sectors: manufacturing (mainly externally traded sectors); market services (mainly non-externally traded sectors); building and construction; agriculture; and government (or non-market) services.

The internal structure of the HERMIN modelling framework can be best thought of as being composed of three main blocks: a supply block, an absorption block and an income distribution block. Obviously, the model functions as an integrated system of equations, with interrelationships between all the subcomponents. Such interdependencies take the form of intersectoral relations, for example, the increase in technical progress in manufacturing affects output of market services through changes in relative prices (a potential negative effect) and through greater consumer demand driven by higher productivity and wages in manufacturing (a potential positive effect). Likewise, HERMIN models allow us to capture negative feedback of public expenditure (e.g., CP) on the private sector through labour market tightening, higher tax rates and higher interest rates (i.e., the crowding-out effect). A full discussion of such interdependencies would require a thorough description of each of the behavioural equations and identities. This work has been done by, among others, Bradley and Untiedt (2010).

Conventional Keynesian mechanisms are relevant only for the short-term behaviour indicated by a HERMIN model. For example, the implementation phase of CP has a demand component, as public expenditure is
increased, but the longer term supply–side benefits do not yet appear. However, the HERMIN model also has many neoclassical features for longer term results. Thus, the output of the manufacturing sector is not simply driven by demand. This output is also influenced by price and cost competitiveness, where firms seek out locations for production with the lowest costs (Bradley & Fitzgerald, 1988). In addition, factor demands in manufacturing and market services are derived by applying the assumption of cost minimization and using a two-factor constant elasticity of substitution (CES) production function constraint, where the capital–labour ratio is sensitive to the relative factor prices. The incorporation of a structural Phillips curve mechanism in the wage bargaining mechanism introduces further relative price effects. For additional information on the applied methodology, see Appendix A1 in the supplemental data online.

**Data**

The regional HERMIN models are composed of two types of equations: behavioural equations and identities. The former contain parameters for which values must be estimated or calibrated, whereas the latter come from the logic of national accounts and represent defined relations.

To feed the models with data, Eurostat was used as the main database for the three groups of regions, namely, the Czech, Polish and Slovak. However, when necessary, missing time series were derived using national databases, that is, databases compiled by the Czech Statistical Office, Polish Statistics (e.g., local data bank) and the Slovak Statistical Office. In addition, monetary aggregate data were obtained from databases compiled by the Czech, Polish and Slovak central banks. Finally, the AMECO database including country-level data was also used. Due to issues regarding data availability and comparability among the three groups of regions, our within-sample data were restricted to the period 1999–2015 (Poland) or 2000–15 (Czech Republic and Slovakia).

Poland has great heterogeneity in terms of economic development and structure (Figure 1). It encompasses both the most lagging and agriculture-oriented regions in the EU and the regions characterized by high-tech services and manufacturing. The Czech Republic stands out as one of the most affluent and economically cohesive CEE countries with highly industrialized regions. Slovakia has one of the largest regional disparities in the EU with no real convergence since 2000 (Alcidi, 2019).

Total CP funding for the national levels in the programming period 2021–27 was estimated on the basis of Regulation (EU) No. 1303/2013 of the European Parliament and of the Council (Regulation), which was applied in the regulation (EU) No. 1303/2013 of the European Parliament and of the Council (Regulation), which was applied in the

**RESULTS AND DISCUSSION**

**Results**

In line with, among others, de la Fuente et al. (1995), Garcia and McGuire (2001), Ederven et al. (2002) and Arcelean et al. (2012), the HERMIN-based simulations clearly show that CP reduces the intra-country divergence processes over the 2021–29 period. However, the impact of CP is rather small (Figure 2). When decomposing this impact into demand- and supply-side effects, the former are larger than the latter. However, the demand-side effects are apparent in only the short run. The impact of CP on the supply side is important for the long-run convergence process and turns out to be fairly negligible. This type of CP effect reflects changes in the structure of the regional economies rather than the short-run Keynesian mechanism. The results seem to be robust across countries and with the use of different measures of intra-country convergence, which is the coefficient of variation, the Gini coefficient, the Atkinson index, the Theil index and mean logarithmic deviation (MLD).

Even though CP promotes lagging regions by giving them greater real financial support in relation to their GDP (see Table A2 in Appendix A in the supplemental data online), it seems not to be effective enough in terms of intra-country convergence. Consequently, EU funding is used more productively in economically stronger regions than in lagging regions. Put differently, poorer regions receive stronger financial support; however, they tend to transmit it into macroeconomic effects less efficiently than economies that are more affluent (e.g., capital regions). As a result, the development gap within countries is barely affected by CP.

Table 1 shows the macroeconomic efficiency of CP as measured by cumulative multipliers. The macroeconomic efficiency at the end of programming period (year 2029) varies substantially among the regions, ranging from 0.76 (Severozápad in the Czech Republic) to 4.35 (Mazowieckie in Poland). The greatest variability in EU-funding efficiency, as measured by the coefficient of variation, is observed in Poland. The difference between the highest value of the cumulative multiplier (Mazowieckie) and the lowest value (Podlaskie) is 3.25 in 2029. Similarly, the values for Slovakia and the Czech Republic are 0.98 (between Praha and Severozápad) and 0.57 (between Bratislavský kraj and Východné Slovensko). This result implies greater similarity in terms of regional economic characteristics in the Czech Republic and Slovakia compared with Poland, which has a more diverse regional pattern with regard to GDP per capita levels and specific economic indicators (e.g., the structure of the output and labour markets) underlying EU funding efficiency. More importantly, the results indicate that the more advanced regional economies in Poland (Mazowieckie and Wielkopolskie), the Czech Republic (Prague and Jiho východ) and

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1. Alcidi, C. (2019). Regional disparities in the European Union. CEPR Discussion Paper 13397.
2. Bradley, G., & Fitzgerald, M. (1988). The Regional Economy and Structural Change. Oxford University Press.
3. de la Fuente, J., García, P., & McGuire, M. (1995). The impact of structural funds on regional growth in the European Union. Journal of European Economic History, 14(4), 539-563.
4. Ederven, H., van der Heijden, H., & van Kessel, G. (2002). The impact of the regional policy on regional convergence in Europe: A simulation model. Regional Studies, 36(4), 337-352.
5. Arcelean, S., Dumont, J., & van Kessel, G. (2012). The impact of spatial policy on regional convergence in Europe: A simulation study. Regional Studies, 46(8), 1281-1296.
6. Results and discussion is based on the analysis of the average GDP per capita data for the period 2013–15.
7. Table A2 in Appendix A in the supplemental data online summarizes the main information about the CP regional allocations and their economic structures.
Slovakia (Bratislavský kraj) are the areas where EU funding is most efficient. To explain these results and better understand the determinants of the macroeconomic efficiency of CP and its impact on intra-country convergence, cumulative multipliers were decomposed into demand- and supply-side measures.

Figure 3a presents the demand-side cumulative multipliers, which, technically, are computed assuming no spillover elasticities. When comparing and contrasting the three countries under study, clearly, the Slovak regions are characterized by stronger Keynesian effects than Czech and Polish regions. The average demand-driven cumulative multipliers in 2029 are 0.96 in the Czech Republic, 1.14 in Poland and 1.66 in Slovakia. The position of the Slovak regions is largely determined by two factors. The first relates to the relatively strong role of building and construction in total Slovak gross value added (8% on average in 2016 compared with 7.3% in Poland and 5.7% in the Czech Republic). This sector is highly exposed to demand-driven effects. Another factor explaining the strong demand-side effects in Slovakia is the structure of EU funding (see Table A2 in Appendix A in the supplemental data online). The Slovak regions show a relatively high share of direct APS (the regional average is 47% compared with 25% and 37% for Poland and the Czech Republic, respectively). Unlike physical infrastructure and human resources, this type of expenditures acts as an exogenous addition to investment in manufacturing and market services, which have a Keynesian impact on the economy.

The CP effects induced on the supply side of the regional economy are important factors in long-term convergence and its sustainability. Figure 3b shows supply-side cumulative multipliers in all three countries. The highest CP efficiency is largely reported across the affluent regions, that is, those including capital cities and those that are the second and third best-performing regions in terms of GDP per capita. This general pattern emerges from the results obtained. However, an enquiry into a set of structural characteristics of regional economies is needed to better understand interregional differences in CP efficiency.

Many structural factors determine the efficiency of CP on the supply side of the economy. These factors interwine with each other through a system of complex interdependencies. However, several structural features of the regional economies can be identified that seem to play a
key role in the efficiency of CP as measured by cumulative multipliers. A comparative analysis of the regions clearly shows that the magnitude of the cumulative multipliers is largely affected by the saturation of the regional economy with physical infrastructure as measured in relation to the GDP. The greater mismatch between public infrastructure stocks and the needs of the growing economy implies the greater role of additional infrastructural investment in stimulating long-term development. As the economy becomes increasingly endowed with physical infrastructure, new portions of capital tend to have a less significant impact on output and employment.\(^9\) Table A2 in Appendix A in the supplemental data online shows that the Czech regions are characterized by the strongest saturation with infrastructure stocks compared with that of the Slovak regions and, in particular, the Polish regions where infrastructure deficits, mainly in the fields of transportation and communication, are still visible. As a result, the regional economies in Poland are characterized by the strongest EU funding efficiency on the supply side of the economy.\(^10\)

Other factors that determine the efficiency of CP are associated with the structure of regional gross value added. The regions with the greatest values of supply-side cumulative multipliers are characterized by the strongest contribution of market services to total gross value added. As Ivanova et al. (2011) report, this sector tends to generate the strongest spillover effects. The role of manufacturing is relatively smaller. There are also additional factors that might considerably improve the efficiency of

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**Figure 2.** Cohesion Policy impact on intra-country convergence in the Czech Republic, Poland and Slovakia (in percentage points, 2021–29 average).

Source: Authors.
EU funding in terms of supply-side effects. The first is labour productivity in market services and manufacturing, which in turn is determined by the level of technological advancement. Regional economies with highly productive manufacturing and market services sectors, such as Mazowieckie and Wielkopolskie in Poland, Bratislavský kraj in Slovakia and Praha and Střední Čechy in the Czech Republic, are more likely to effectively absorb EU support and make full use of new infrastructure. Put differently, businesses based in such regions have greater capacity in terms of technology, human capital, organization and management skills, which enables them to use improved transport and communication infrastructure stocks, upgraded machinery and trained staff in a more productive manner. The relevance of the structural factors in affecting the efficiency of CP is clearly seen in Poland, where the economic structure of EU funding is assumed to be the same across regions.

However, the structure of CP allocation, that is, the role of physical infrastructure, human resources and direct aid to the productive sector (including R&D) in total CP expenditure also plays an important role in determining the efficiency of CP on the supply side. Polish regions receive the greatest share of physical infrastructure in terms of total allocation (an average of 55% compared with 45% and 35% for Slovakia and the Czech Republic, respectively). This kind of investment tends to yield the highest returns, as reflected by the spillover elasticities (see Table A1 in Appendix A in the supplemental data online). The parameters for the output of manufacturing and market services in the Czech Republic show the highest values of the three countries under study. However, due to the low share of physical infrastructure in terms of total CP allocation in Czechia, supply-side effects as measured by cumulative multipliers are not as high as expected. This allocation pattern seems to correspond with the strong saturation of the Czech economy with physical infrastructure.

Sensitivity analysis
Our results document that the structural characteristics of regional economies tend to play an important role in

| Poland | Slovakia | Czech Republic |
|--------|----------|----------------|
| DL     | 2.57     | JV 1.55        |
| KP     | 1.65     | JZ 1.21        |
| LB     | 1.76     | MS 0.85        |
| LD     | 2.90     | PR 1.74        |
| LL     | 1.32     | SC 1.29        |
| ML     | 2.66     | SM 0.96        |
| MZ     | 4.35     | SV 0.86        |
| OP     | 1.54     | SZ 0.76        |
| PD     | 1.10     |                |
| PK     | 2.10     |                |
| PM     | 2.15     |                |
| SL     | 2.47     |                |
| SW     | 2.13     |                |
| WL     | 3.30     |                |
| WM     | 1.24     |                |
| ZP     | 1.57     |                |

Source: Authors.
determining the macroeconomic efficiency of CP. Specifically, the ratio of physical infrastructure stock to GDP is one of the key determinants of the efficiency of CP. It seems unreasonable, however, to assume that the lower infrastructure stock to GDP constantly generates a greater rate of return on CP investment. Several economically stronger regions with fast-growing economies, for example, capital regions (Bratislavský kraj, Prague), seem to be already well endowed with public physical infrastructure. Put differently, their transportation systems, education, health and social infrastructure are fairly well developed and thus effectively support economic development. Hence, any additional elements of infrastructural capital might produce truly negligible effects, if any at all, even though physical infrastructure stocks account for a relatively small part of fast-growing economies. Real saturation with public infrastructure should be addressed by diversified spillover elasticities across regions, preferably those that are time-variant. The lack of such elasticities for the regions in question encouraged us to conduct a sensitivity analysis. To this end, the spillover elasticities for physical infrastructure were set to zero in all the economically strongest regions, namely, the regions with GDP per capita above the country’s average. This analysis allowed us to verify whether the lack of the role of physical infrastructure in triggering the efficiency of CP in more affluent regions might have an important impact on intra-country convergence as measured by the five measures mentioned above.

The results in Table 2 reveal that the impact of CP on intra-country convergence has not changed substantially as any influence of the infrastructure on the supply side of the richest economies was eliminated. In the case of Slovakia and the Czech Republic, only the capital regions have GDP above 100% of the country average, and these regions allocate relatively less funding to physical infrastructure. Consequently, a relatively stronger effect has been reported for Poland. However, even in Poland, the long-run supply-side impact of CP is still small. Taking these outcomes into account, one can state that structural factors, such as the gross value-added structure or labour productivity, and the technological advancement of regional economies play a decisive role in determining the efficiency of CP and its impact on intra-country convergence.

In consequence, our results provide additional arguments on the conclusions of, among others, Cappelen et al. (2003) and Bachtler et al. (2019), by revealing that any significant impact of CP in narrowing the intra-country development gap seems to be infeasible when fully fledged structural reforms are not in place.

Policy discussion
The results obtained seem to contradict the neoclassical growth models presented by Solow (1956), Swan (1956) and Borts and Stein (1964) that suggest a natural process of catching up by lagging countries/regions. On the contrary, our results seem to align more closely to another strand of theories based on endogenous growth models (e.g., Romer, 1986; Lucas, 1988). Along with the concept of cumulative causation (Kaldor, 1970) and new economic geography (Fujita et al., 1999; Fujita & Thisse, 2002; Baldwin et al., 2003), endogenous growth theory implicitly indicates that public investment in R&D and human capital or even transport infrastructure might be more efficient in more advanced countries or regions. These regions tend to more effectively absorb financial support and translate it into more spectacular economic effects. As Farole et al. (2009, p. 25) (after Rodríguez-Pose, 1999) argue, ‘the local economic tissue may lack the capacity to successfully absorb the fruits of technological progress realized elsewhere and to achieve the passage to innovation themselves’. Essentially, the concentration of R&D and high-quality human resources stimulates returns on R&D expenditure (Audretsch & Feldman, 1996; Engelbrecht, 1997). It is to the detriment of less-developed countries or regions lacking capacity that they successfully attract physical and human capital.

Bearing the above in mind, a need for a more effective structural policy should be emphasized. The implementation of structural reforms focusing on the greater role of more productive and technology-intensive market services and manufacturing should increase the macroeconomic efficiency of public intervention, for example, CP. Such conditions guarantee that physical and R&D infrastructure and human capital resources will be used more effectively. Therefore, several recommendations are presented.

First, more effective national strategies should be developed for regional restructuring. The path dependency in regional development requires complex, multidimensional and multi-sectoral national support in the long run. Although strategies involving smart specializations have been pursued since 2014, their impact on changes in the structure of gross value added seems to be rather negligible in the regions under consideration here. A regionalized, or place-based, modus operandi in terms of introducing structural changes is necessary to enhance structural transformation. This is vital regardless of whether the structural transformation is largely focused on foreign direct investment, the largest regional companies that might become a driving force behind reindustrialisation or, perhaps, some other operationalization more appropriate for a specific region.

Second, a clear objective should be introduced in the CP intervention that directly addresses the restructuring of regional lagging economies. In CP there is a lack of distinctive focus on macroeconomic restructuring, as understood by shaping the regional structure of gross value added and the labour market. Programming this type of CP intervention usually comes down to fairly enigmatic references to national and regional strategies. The diminished role of CP in terms of shaping the macroeconomic structure is clearly seen in Cohesion Reports, which are key EU publications on socio-economic and territorial cohesion that barely touch on any macroeconomic structural changes. Moreover, since the 2008 financial crisis, these reports seem to emphasize the role of CP in
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Table 2. Cohesion Policy impact on intra-country convergence in Poland, Slovakia and the Czech Republic (in percentage points, 2021–2029 average) – sensitivity analysis.

|                    | Poland          | Slovakia        | Czech Republic |
|--------------------|-----------------|-----------------|----------------|
|                    | Supply side     | Demand side     | Supply side     | Demand side     | Supply side     | Demand side     | Supply side     | Demand side     |
| Coefficient of variation | -0.4 (-0.1)    | 0.1 (0.0)       | -0.1 (0.0)      | 0.0 (0.0)       | 0.0 (0.0)       | 0.0 (0.0)       | -0.8 (0.0)      | -0.1 (0.0)      |
| Gini coefficient   | -0.8 (0.0)      | -0.3 (0.0)      | -0.4 (-0.2)     | -0.3 (0.0)      | -0.3 (0.0)      | -0.3 (0.0)      | -0.1 (0.0)      | -0.1 (0.0)      |
| Atkinson index     | -0.5 (0.0)      | -0.3 (0.0)      | -0.4 (-0.2)     | -0.2 (0.0)      | -0.2 (0.0)      | -0.2 (0.0)      | -0.1 (0.0)      | -0.1 (0.0)      |
| Theil index        | -1.1 (-0.5)     | -0.7 (-0.2)     | -0.4 (-0.2)     | -0.7 (-0.2)     | -0.7 (-0.2)     | -0.7 (-0.2)     | -0.1 (0.0)      | -0.1 (0.0)      |
| Mean logarithmic deviation | -0.8 (0.0)    | -0.8 (0.0)      | -0.8 (0.0)      | -0.8 (0.0)      | -0.8 (0.0)      | -0.8 (0.0)      | -0.1 (0.0)      | -0.1 (0.0)      |

Note: Values in parentheses represent the absolute deviation from values presented in Figure 2.

Source: Authors.

stimulating aggregate demand rather than concentrating on its long-term impacts on the structure of regional economies (European Commission, 2017). Consequently, the focus is on the short-term, conjuncture-related character of EU support rather than on its fundamental objective: building a long-term sustainable economic structure that could help lagging regions effectively bridge the gap and become more affluent regions.

Third, it would be worthwhile to require reports to discuss the structural changes in the European Semester to prioritize this field of public intervention. A more structure-oriented and flexible CP (place based, for example, in terms of development objectives and addressing specific regional problems and potentials) is more likely to support national structural policies.

Fourth, as there are global megatrends and ‘black swan’ events such as the Covid-19 pandemic that the EU is currently confronting, the importance of EU-wide programmes, instruments and financial packages is growing. Examples are Health4Europe, the Green Deal and Next-GenerationEU, where most funds are channelled through the Recovery and Resilience Facility. In addition, CP appears to be more focused on meeting EU-wide objectives than on addressing specific regional structural problems. While these policies and initiatives are of great importance for the long-term development of the EU as a whole, they do not necessarily align with reducing regional disparities. This is mainly because they seem to downplay the subsidiarity principle, which takes into account regional potential and specific challenges such as restructuring. Therefore, it is important to emphasize the need to find the right balance between pan-European goals, going beyond national interests and potential, and a territorial approach. The Territorial Agenda 2030 and European Observation Network for Territorial Development and Cohesion (ESPON)-related research (e.g., ESPON, 2018, 2020; Balz et al., 2021) provide a solid framework for greater territorialization of EU policies, including CP. As the Covid pandemic is expected to trigger changes in global value chains, alignment of EU-wide initiatives with national and regional programmes is set to become increasingly important. Worthy of emphasis here is the important role of the Just Transition Fund as a key tool to restructure the regional economies most affected by the transition towards climate neutrality.

CONCLUSIONS

It is reported that the EU CP contributes to the socioeconomic development of the CEE regions and, consequently, stimulates their convergence with respect to the EU average (e.g., Zaleski et al., 2016; Védrine & Le Gallo, 2021). In doing so, it meets one of the goals of the Treaty of Rome and, subsequently, the Treaty of Lisbon: interregional economic cohesion across the EU. The other perspective on regional disparities, that is, within-country convergence, is not formally embedded in the CP programming mechanisms. However, it has an increasingly stronger impact on inequality in the EU.
(Monfort, 2020). Hence, analysis of the mechanisms underlying the CP impacts on within-country convergence is of key importance for effectively addressing overall disparities in the EU.

The aim of this paper was to analyse the role of the macroeconomic efficiency of CP in affecting intra-country economic cohesion as reflected by various measures of sigma convergence for the Czech, Polish and Slovak regions. This paper is the first HERMIN-based research involving regions in different CEE countries.

As the impact of CP on economic convergence in the long run was of interest, considerable focus was placed upon the supply side of the regional economies. In other words, emphasis was placed on how productive CP support is in terms of its impact on GDP through the expansion and modernization of the technical infrastructure and the increase in knowledge and skills as well as the expansion and upgrading of machinery and equipment in enterprises. The results reveal that EU funding has hardly any impact on cushioning intra-country divergence in the long run. This occurs even though the lagging regions benefit from greater real EU support, that is, as measured in relation to their GDP. Consequently, the results imply that lower real EU-funding injections to more affluent regions are compensated by higher efficiency of CP. Furthermore, it was revealed that the supply-side component of EU funding efficiency is positively determined by the lower saturation of the regional economy with capital stocks, the greater role of market services and their productivity, and higher levels of technological progress.

The results also suggest that CP seems to be doomed to failure in terms of reducing intra-country divergence. In other words, the structural differences among regional economies effectively prevent EU support from narrowing the development gap between regions. In the short-run, that is, during the implementation phase of EU support, CP funding might have a more significant impact on convergence through demand-side effects. However, in the long run, which should be the most relevant from the perspective of the CP intervention, economically stronger regions tend to use EU funding more effectively on the supply side of their economies. Specifically, their use of additional capital and R&D support is more productively absorbed through the structure of their economies.

Although widely used, the methodology applied in our research study faces some limitations (Hallet & Untiedt, 2001). Specifically, the spillover elasticities are country-specific rather than region-specific, which prevents controlling for differences in the quality of public interventions across regions. This is a common problem of impact analysis using macroeconomic modelling and calls for comprehensive research on the spillover elasticities for EU NUTS-2 regions. Moreover, stand-alone HERMIN models are utilized, that is, interregional links are exogenous. In future research, an attempt should be made to construct a system of models for Czech, Slovak and Polish regions interlinked endogenously through interregional trade flows. This would enable analysis of the spillovers of CP effects across regions.

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NOTES

1. A total of €198.6 billion out of €330.6 billion over the 2021–27 period is earmarked for less developed regions (European Commission, 2018).

2. In line with the treaty establishing the European Community, CP should not, of course, be limited to the reduction of income disparities, but should also involve unleashing regions’ untapped potentials.

3. Rodríguez-Pose (2018) shows that territorial inequality along with a persistent lack of opportunities and the incapacity or unwillingness to relocate are the main drivers behind territorially based populism.

4. Sigma convergence is defined as a reduction in the dispersion of the levels of gross domestic product (GDP) per capita across regional economies within a country.

5. For a critical review of applying the growth regression approach to modelling policy impacts, see Rodrik (2005).

6. The detailed methodology used to calculate CP funding projections can be obtained from the authors upon request.

7. The same set of sigma convergence measures applied in Monfort (2008) were applied in the present paper. The regional disparities were computed for Poland, Slovakia and the Czech Republic in terms of GDP per capita. The regions were weighted by their population. The Theil index and MLD satisfy all properties of inequality measures, that is: the mean or income-scaled independence; principle of population; symmetry or anonymity; the Pigou–Dalton transfer principle; and decomposability. The other measures in question comply with the first four properties.

8. These are the exogenous parameters that show the percentage change in output and productivity in the manufacturing and market services sectors due to supply-side effects induced by public investments. For more details, see Appendix A1 in the supplemental data online.

9. To illustrate this, one can picture a region in which the first airport is opened. Provided that the region offers advantageous possibilities for running a business, it is
conceivable that the airport would have a positive effect on the economy because it considerably improves accessibility. Any additional airport would, however, tend to produce less spectacular economic effects by contributing to the greater comfort of residents rather than better economic performance. When maintenance costs are taken into account, any additional airport infrastructure might even harm the regional economy.

10. Relatively low variation of the ratios of human capital to GDP and R&D stocks to GDP across the regions coupled with relatively low spillover elasticities of those two expenditure categories reduce their role in determining the efficiency of CP as measured by the cumulative multipliers. Both ratios for each region in the three countries analysed are available from the authors upon request.

11. In the HERMIN models, this is reflected by the Hicks neutral technical progress. The parameters are available from the authors upon request.

12. The role of labour productivity is clearly seen when comparing the regions of Mazowieckie and Wielkopolskie with Śląskie. Even though the latter is characterized by the low saturation of infrastructure and a high share of market services compared with that of Mazowieckie and Wielkopolskie, and, in turn, lower values of the cumulative multipliers.

13. In Poland: Mazowieckie, Dolnośląskie, Śląskie and Wielkopolskie. In Slovakia: Bratislavsky kraj. In the Czech Republic: Prague.

14. This neoclassical convergence mechanism might be strengthened by public intervention (e.g., CP). Specifically, improved transport infrastructure facilitates the movement of capital among regions and, in turn, increases output growth in less developed regions (European Commission, 2014). Consequently, in line with the neoclassical rationale, public investment undertaken in lagging regions should be more efficient than in more advanced territories.

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