



Università Ca' Foscari Venezia

**MASTER THESIS IN
GLOBAL DEVELOPMENT AND
ENTREPRENEURSHIP**

The Role of EU Cohesion Policy Funds in Shaping Economic Development in Czechia, Bulgaria, and Romania during the 2014–2020 Programming Period

Master Candidate:
Bilge Ebru ÜSTÜN

Supervisor:
Dr. Koray AKTAŞ

Student ID: **898144**

Academic Year: **2024/2025**

*To my family and friends for always believing in me,
and to my dog Bal, whose love has been a source of inspiration.*

Abstract

This thesis focuses on the economic consequences of the European Union Cohesion Policy Funds on the development patterns of Czechia, Bulgaria, and Romania during the 2014–2020 programming period. The analysis at both the national and NUTS-2 regional levels investigates how structural funding influences national economic growth and regional convergence in the context of the EU. The primary objective of this research is to assess whether the EU Cohesion Policy Funds have a significant impact on promoting economic development across the selected countries. To this end, the analysis relies on a panel dataset evaluating the relationships between EU funds and key drivers of economic performance such as productivity, business activity, employment, and foreign direct investment (FDI). A fully quantitative methodology is employed, using lagged independent variable models to capture the effects of funding inflows on economic indicators. Data for the analysis are drawn from Eurostat, the Kohesio database, and the Cohesion Open Data Platform, providing information on regional economic indicators and EU Cohesion Fund allocation. Preliminary results suggest a positive association between fund allocation and economic performance at both the country and regional levels, with stronger effects observed in disadvantaged regions. The results also highlight differences in institutional quality and absorption capacity between countries. Additionally, Total Factor Productivity (TFP) was calculated using two distinct approaches—capital-based and human capital-based—to provide a more comprehensive analysis of productivity effects at the regional level. This research contributes to the ongoing academic discussions on the role of EU Cohesion Policy in reducing regional development disparities among member states.



Table of Contents

Abstract	i
Table of Contents	iii
1 Introduction	1
1.1 Scope and Objectives of the EU Cohesion Policy	1
1.2 Historical and Programming Context: From 1988 to the Present	2
1.3 Theoretical Foundations and Literature Linkages	3
1.4 Trends and Methodological Challenges in the Literature	4
1.5 Contribution of the Thesis	5
1.6 Data, Indicators, and Control Variables	5
2 Theoretical Background and Literature Review	7
2.1 European Union Cohesion Policy and Its Impact on Economic Development	7
2.1.1 Overview of EU Cohesion Policy: Goals, Instruments, and Logic . .	8
2.1.2 European Regional Development Fund (ERDF): Innovation, Pro- ductivity, and Structural Change	8
2.2 Theoretical Foundations of Cohesion Policy	9
2.2.1 Endogenous Growth Theory	9
2.2.2 Convergence Theory	10
2.2.3 Institutional Economics	11
2.2.4 Spatial Economics	11
2.2.5 New Economic Geography (NEG)	12
2.2.6 Intersections Among Theoretical Approaches and Implications for Cohesion Policy	12
2.3 Empirical Literature on the Impact of EU Funds	13
2.3.1 Assessing EU Cohesion Policy in Less Developed Regions	14
2.3.2 Spatial Models and Lagged Effects	16

2.3.3	Temporal and Geographic Heterogeneity	18
2.3.4	Country Cases: Czechia, Romania, and Bulgaria	19
2.3.5	Conditionality and Governance Quality	20
2.3.6	Entrepreneurship and Innovation Indicators	22
2.3.7	General Evaluation and Simulation Models	23
2.3.8	Regional Resilience and Crisis Response	24
2.3.9	Role in Green and Digital Transitions	25
2.3.10	Learning Effects in Post-2004 Member States	25
3	Methodology	27
3.1	Research Design	27
3.2	Data Sources	28
3.3	Variables and Definitions	29
3.3.1	Dependent Variables	30
3.3.2	Independent Variable	30
3.3.3	Control Variables	31
3.4	Empirical Model Specification	32
3.4.1	Regional-Level Model	32
3.4.2	National-Level Model	32
3.4.3	Estimation Strategy	33
3.5	Justification of Control Variables	33
3.5.1	Gross Expenditure on R&D (GERD)	33
3.5.2	Household Income	34
3.6	Country Selection Rationale	34
3.6.1	Case Selection Rationale	35
4	Descriptive Statistics and Preliminary Observations	37
4.1	Structure of the Dataset	37
4.1.1	Regional (NUTS-2) Level Structure	37
4.1.2	National Level Structure	38
4.2	Descriptive Statistics: Regional Economic Structure and Variation	38
4.2.1	GDP, Employment, and Labor Productivity Structure	41
4.2.2	Total Factor Productivity (TFP)	45
4.2.3	Enterprise Dynamics	49
4.3	Descriptive Statistics: National Economic Structure and Variation	52
5	Empirical Analysis and Results	59
5.1	Regional-Level Analysis	59

5.1.1	Gross Domestic Product (GDP)	60
5.1.2	Employment	61
5.1.3	Labor Productivity	62
5.1.4	Total Factor Productivity (TFP)	64
5.1.5	Enterprise Births	65
5.1.6	Birth-to-Death Ratio	66
5.1.7	Enterprise Growth Rate	67
5.2	National-Level Analysis	68
5.2.1	Effect of EU Funding on GDP and GDP per Capita	69
5.2.2	Effect of EU Funding on International Trade	70
5.2.3	Effect of EU Funding on FDI Stocks	71
5.2.4	Effect of EU Funding on Employment and Labor Productivity	73
5.2.5	Effect of EU Funding on Total Factor Productivity	74
5.2.6	Effect of EU Funding on Enterprise Dynamics	75
5.3	Comparative Interpretation of Regional and National-Level Results	76
6	Conclusion	79
6.1	Summary of Findings and Contributions	79
6.2	Reflections and Concluding Remarks	81
6.3	Policy Implications and Territorial Insights	82
6.4	Strategic Implications and Directions for Future Research	83
	Bibliography	87
	Appendix A:	97
	List of Tables	99
	Acknowledgement	101



1 | Introduction

The European Union's Cohesion Policy is one of the key elements of the EU's overall policy to address regional disparities in social and economic development in its Member States. It represents an incredibly complex and dynamic policy tool that involves two main elements - the redistribution of financial resources and the specific planning approach aimed at helping less developed regions deal with their structural problems. This chapter introduces the essential concepts and institutional context to set out the policy to appreciate its history and evolution, its theoretical foundations and the ensuing empirical debates around its effectiveness. Furthermore, it provides the context for defining the scope, objectives and programming cycle of Cohesion Policy, and illustrates the theory that shapes Cohesion Policy's design and delivery. Finally, the Chapter defines the specific contribution and methodological design of the thesis. The focus of the thesis is the 2014 - 2020 programming period in three Eastern European countries: Czechia, Bulgaria and Romania.

1.1. Scope and Objectives of the EU Cohesion Policy

Cohesion policy of the European Union is one of the important instruments for fostering economic, social and territorial cohesion in the EU as a Union and in its Member States. The EU's Cohesion policy is enshrined in Article 174 of the Treaty on the Functioning of the European Union (TFEU) where specific objectives are aimed at "promoting the harmonious, balanced and sustainable development of the Union as a whole, reducing the gaps in the levels of development between the various regions and assisting the regions considered to be the least favoured". Cohesion policy tackles the structural disparities that the process of integration in a unified market is unable to tackle which encourages inclusive and sustainable forms of development (Commission, 2023a,b).

Cohesion Policy is a living and breathing framework that is no longer merely a redistributive tool; it is an active driver of structural change. It is no longer enough to fund convergence; Cohesion Policy is now responsible for the delivery of green and digital transitions, institutional capacity and economic resilience. This represents progress toward

the broader EU aim of leaving no region behind on the pathway to smart, sustainable and inclusive growth.

Cohesion Policy is implemented through multi-annual financial frameworks and is spent through three principal structural funds. The European Regional Development Fund (ERDF) supports investments in infrastructure, digitalisation, research and innovation, and SME competitiveness. It also aims at correcting regional disparities by providing different co-financing rates according to the developmental level of each region (Commission, 2023a). In addition, the European Social Fund Plus (ESF+) seeks to enhance employment opportunities, encourage social cohesion, and invest in education and skills development. In particular, it emphasizes youth employment, gender equality, and the inclusion of disadvantaged groups (Commission, 2023b). Meanwhile, the Cohesion Fund (CF) focuses on Member States with a Gross National Income (GNI) per capita of less than 90% of the EU average, and is oriented towards large-scale environmental infrastructure projects and major transport infrastructure initiatives.

These funding instruments support multidimensional development aspects, from infrastructure and digital transition to social equity and the reform of public administration. Cohesion Policy is placeless and thus takes a place-based approach, adapting interventions to the unique territorial needs and development capacities of regions (Barca, 2009).

Given the disparities in income and institutional capacities that exist across EU regions, Cohesion Policy can be viewed as not only a financial redistributor in its own right, but also as a different type of strategic alignment shift in terms of development snapshots and subsequent regionally based transformations. The remaining introduction material will provide the policy's background, an overview of implementation over the course of the programming period, and a discussion of the policy's theoretical underpinning. The reasons for identifying Czechia, Bulgaria, and Romania will be provided in an introductory part and further clarified in subsequent sections.

1.2. Historical and Programming Context: From 1988 to the Present

The 1988 reform was a crucial hinge point in the history of the EU Cohesion Policy, which adopted a number of performance-oriented principles and established the beginning of multi-annual programming. The 2000-2006 period made the policy framework more institutionalized and extended the bases for pre-accession supports for future Member States in Central and Eastern Europe. (Bachtler and McMaster, 2008).

After the 2004 and 2007 rounds of enlargement, there were notable development gaps between the old and new member states. The 2007-2013 programming period was the first full period for Romania and Bulgaria, which emphasised infrastructure and basic public services. However, there were significant issues with weak governance structures and limited administrative capacity that created real challenges for effective implementation.

The period from 2014 to 2020 marked the arrival of a more strategic and results-oriented policy paradigm, with several innovations. At least 80% of funds were focused on thematic objectives like innovation, digitalisation and climate action. Ex-ante conditionalities were established to address regulatory compliance and institutional transformation. A 6% performance reserve was created to reward successful projects. Financial instruments were increasingly promoted alongside traditional grants (Commission, 2020).

The 2021–2027 programming period solidified the green and digital transitions agenda while at the same time also introduced new recovery instruments responding to the COVID-19 pandemic. These, including REACT-EU and the Recovery and Resilience Facility (RRF), were implemented within the cohesion policy framework. According to the European Commission, “the new cohesion policy framework aims to ensure that no region is left behind in the twin transition to a green and digital Europe” (Commission, 2021).

1.3. Theoretical Foundations and Literature Linkages

Multiple economic theories can provide a foundation for EU Cohesion Policy. Convergence Theory (Solow, 1956) implies that less prosperous regions have a tendency to grow faster than their wealthier rivals which eventually leads to a decrease in regional disparities over time. Endogenous Growth Theory (Romer, 1990) emphasizes importance of innovation, human capital and knowledge accumulation for sustained economic growth in the long run. Institutional Economics (North, 1990) emphasizes that how governance structures and institutional quality influence the impacts and efficiency of public policy. New Economic Geography (NEG) (Krugman, 1991) focuses on spatial concentration, economies of scale, and transport costs to explain why economic activity tends to cluster. NEG helps explain persistent regional disparities and the spatial rationale behind cohesion policy interventions. Spatial Economics extends NEG – considerations of spatial spillovers, inter-regional linkages and network effects. This scheme recognizes the need for spatial models and lagged effects to be included in impact assessments, especially of functional regions and contiguous development. Intersections Among Theories suggest that the reality of regional development is situated in economic convergence, institutional

quality, spatial interdependence and innovation. Therefore, because cohesion policy will touch on several elements of overlapping and interacting constructs, it must be approached through a multi-theoretical framework.

Empirical research has provided empirical backing for these theoretical positions by demonstrating that the impact of cohesion funding depends on regional governance capacity and absorptive capacity (Ederveen et al., 2006; Rodríguez-Pose and Fratesi, 2004). For example, Crescenzi and Giua (Crescenzi and Giua, 2020) claim "the impact of cohesion policy differs not only by country but also by region, based on their governance capacity and absorptive capacity." The findings underscore the need to embrace context-specific, multi-level frameworks when researching cohesion policy.

1.4. Trends and Methodological Challenges in the Literature

The economic effects of EU Cohesion Policy have received substantial attention for two decades. The early works often focused on quantitative outcome indicators such as GDP and employment levels (Becker et al., 2010), and the notion of macroeconomic convergence across Member States and regions. The new literature has shifted toward notions of quality and institutions, suggesting that such notions as quality of governance, administrative capacity and the efficiency of absorption, play key roles in the effectiveness of Cohesion Policy (Rodríguez-Pose and Fratesi, 2004).

A central methodological problem for most of this work relates to the timing of observable effects. Many works suggest that cohesion funding has a long delay to absorption and to observable economic effects—especially in structurally weak regions. Hence, scholars often used lagged independent variables (e.g., funding at $t-1$) in panel regression models to capture these delayed effects (Mohl and Hagen, 2010).

The empirical evidence still remains quite mixed and context-dependent. While some studies suggest positive and statistically significant effects of cohesion policy on regional growth and employment, others stress significant heterogeneity across countries, regions, and settings of governance (Crescenzi and Giua, 2020; Rodríguez-Pose and Fratesi, 2004; European Commission, 2022a). As Crescenzi and Giua (Crescenzi and Giua, 2020) explain, "cohesion policy effects depend as much upon the place and way funding is used as the amount spent".

The heterogeneity of findings reinforces the need to use flexible and context-sensitive empirical approaches capable of accounting for regional differences, lags, and differences

in governance quality across the EU.

1.5. Contribution of the Thesis

This thesis investigates the economic impact of EU cohesion funding in Czechia, Bulgaria, and Romania during the 2014–2020 programming period. It draws on both national-level and NUTS-2 regional data, with a primary focus on regional-level dynamics.

The study makes several key contributions. It adopts a dual-method approach to Total Factor Productivity (TFP) estimation—using both capital-based formulations and HRST-based productivity models—allowing for comparative insights into productivity performance across different regions. It integrates both quantity-based outcome indicators (GDP, employment) and quality-based metrics (labor productivity and TFP) to offer a multidimensional assessment of cohesion policy impacts. It also analyzes enterprise dynamics by examining firm birth and death rates along with the number of active enterprises, thereby evaluating how cohesion funds influence entrepreneurial behavior and firm responsiveness. Furthermore, it employs lagged ($t-1$) independent variables in regional panel regressions to capture policy implementation delays and the gradual transmission of funding effects.

By combining methodological rigor with multidimensional empirical evidence, this thesis contributes to a deeper understanding of how cohesion policy outcomes vary across spatial, temporal, and institutional contexts.

1.6. Data, Indicators, and Control Variables

All variables used in this thesis were obtained from reliable European-level sources such as Eurostat, the Kohesio database, and the Cohesion Open Data Portal. The dataset covers both national and NUTS-2 (regional) level information for the 2014–2020 programming period.

Dependent variables include a range of national and regional indicators designed to capture the economic impact of EU Cohesion Policy. At the national level, the analysis considers GDP and GDP per capita, employment, trade data (exports and imports), inward and outward foreign direct investment (FDI), gross fixed capital formation (GFCF), firm dynamics (business births, deaths, and number of active enterprises), and derived indicators including labor productivity (GDP/employment), enterprise growth rate (births/active enterprises), business birth/death ratio, and total factor productivity (TFP) – calculated using both GFCF-based and HRST-based methods. At the regional (NUTS-2) level, the

analysis includes regional GDP, employment, gross fixed capital formation (GFCF), firm dynamics (business births, closures, and number of active enterprises), and derived indicators including labor productivity (GDP / employment), enterprise growth rate (births / active enterprises), birth/death ratio, and total factor productivity (TFP) – calculated using two different methods: GFCF-based and HRST-based.

Control Variables: GERD (Gross Expenditure on R&D): A proxy variable representing regional innovation capacity, Household Income: A socioeconomic indicator reflecting regional purchasing power and overall welfare levels.

In line with the empirical literature that highlights the delayed manifestation of policy impacts, these control variables are included in the model with a one-year lag ($t-1$) at the regional level and in the current year (t) at the national level.

2 | Theoretical Background and Literature Review

A strong theoretical basis and thorough review of the empirical literature is important for assessing the economic effects of the Cohesion Policy of the European Union. This chapter considers the major theoretical frameworks for regional development policy and the literature on the evaluation of EU funding, as well as the dimensions of the regional development process which are used in the theoretical framework, which aims to take into consideration the complexity of the developments. The individual themes emerge from the literature on multidimensionality, spatial economics, institutional capacity, quality of governance, and innovation processes. It is also important to provide new member state examples from research in nations like Czechia, Bulgaria, and Romania to recognise their differences in implementation and outcomes. The themes selected for analysis include institutional learning, crisis adaptation, transition to green and digital economies, and entrepreneurship. These themes generally align with recent trends in academic literature. Together, the different approaches provide an analytic base for the empirical strategy developed in this thesis.

2.1. European Union Cohesion Policy and Its Impact on Economic Development

The European Union's Cohesion Policy constitutes a fundamental pillar of the European Integration project aimed at fostering not only equitable and inclusive growth across member states, but more importantly, across their regions. Cohesion Policy is built on the values of solidarity and territorial cohesion, and through multiyear programming and varied funding instruments, endeavors to alleviate imbalances in income, employment, infrastructure and knowledge and innovation in less developed regions in order to facilitate fundamental convergence in the long-run within the EU (European Commission, 2022a).

In this section, we will first provide a description of the aims, mechanisms, and funding

instruments of Cohesion Policy and then we will explore how Cohesion Policy has affected the economic development of three post-socialist Member States, Czechia, Bulgaria, and Romania. These Member States have similar transitional experiences, but exhibit considerable variation with regard to administrative capacity, administrative maturity, and absorption capacity. They offer ideal member state case study opportunities for comparative analysis evaluation.

2.1.1. Overview of EU Cohesion Policy: Goals, Instruments, and Logic

Cohesion Policy in the European Union is one of the main components of European integration. Article 174 of the Treaty on the Functioning of the European Union (TFEU) states that "the Union shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions." In multiannual programming cycles, the Cohesion Policy seeks to tackle structural imbalances and also contribute to medium- and long-term economic convergence among Member States and regions.

Cohesion Policy operates via three core funding instruments. The European Regional Development Fund (ERDF) targets regional competitiveness, innovation, and infrastructure. The European Social Fund Plus (ESF+) focuses on employment, human capital development, and social inclusion. The Cohesion Fund (CF) supports environmental and transport infrastructure in lower-income Member States.

More than €392 billion has been allocated for the 2021–2027 period. The distribution of funds is primarily based on GDP per capita compared to the EU average. The effectiveness of these funds depends on factors such as institutional quality and strategic alignment with EU goals (Commission, 2023a,b).

The purpose of this section is to assess the regional economic development effects of the ERDF, ESF+, and CF for the Czech Republic, Bulgaria, and Romania—three post-socialist countries that share certain legacies, yet displayed differing capacity (and thus performance) in relation to implementation of cohesion policy.

2.1.2. European Regional Development Fund (ERDF): Innovation, Productivity, and Structural Change

The ERDF was born in 1975 and is the EU's most extensive structural fund. It supports regional innovation, competitiveness of small and medium-sized enterprises (SMEs),

digitalisation, and sustainable economic change. The ERDF contributes to the macro-economic system in terms of total factor productivity (TFP), worker productivity, and firm dynamics.

Country examples include the following. In Czechia, the ERDF is a co-funder of the CEITEC hi-tech research center in Brno, which demonstrates national RIS3 strategies and proposes innovation (Crescenzi and Giua, 2020). In Romania, it financially supported industrial clustering in Timis, urban switching in Cluj-Napoca, but not much happened in Nord-Est. In Bulgaria, ERDF supported digital infrastructure development and SME programs in Plovdiv and Varna, but with limited productivity improvements observed in the North-West region.

(Mohl and Hagen, 2010) points out, the ERDF can only be relevant based on the quality of governance. This thesis assesses the impact of ERDF via TFP, labor productivity and enterprise creation as an impact measure.

2.2. Theoretical Foundations of Cohesion Policy

The European Cohesion Policy is not simply a funding tool to address regional inequalities; rather, it is a complex policy framework that is based on different economic theories (Molle, 2007). Its structure and implementation show the interaction of endogenous and exogenous drivers of development, patterns of spatial economic activity, and the quality of governance (Bachtler and McMaster, 2008). There are different theoretical perspectives of cohesion policy that must be understood in order to interpret the ways that structural funds relate to economic performance across different regions and countries (Crescenzi and Giua, 2016).

In this section, the six main theoretical perspectives that have provided a basis for the rationale, process, and effects of cohesion policy have been outlined; they are endogenous growth theory, convergence theory, institutional economics, spatial economics, new economic geography (NEG) and intersections among theories. These theoretical perspectives support the justification for EU funding and serve as analytical lenses for assessing the different impacts, particularly in transition economies, especially in the Czech Republic, Bulgaria and Romania (Rodríguez-Pose and Fratesi, 2004).

2.2.1. Endogenous Growth Theory

Endogenous growth theory suggests that economic growth in the long run arises from internal factors such as human capital, innovation and knowledge generation, rather than

exogenous factors of technological shocks (Romer, 1990). (Barro, 1990) states that favorable public policy can catalyse internal growth by developing research and development (R&D), education and innovation systems.

The EU's Smart Specialisation Strategy (RIS3) guided the allocation of ERDF funding between 2014 and 2020, enabling targeted investment in region-specific innovation priorities. CEITEC in Brno, Czechia, which received ERDF funding, is a key example of joint sector engagement between industry and academia serving to develop the local innovation ecosystem (Commission, 2021). Similar investments in North-East Romania have ended with limited returns on the investment due to low R&D intensity and low absorptive capacity.

(Crescenzi and Rodríguez-Pose, 2017) demonstrate that the return on innovation aspects of EU funded R&D investments have a lag, which is even greater for small and medium sized enterprises (SMEs). (Rodríguez-Pose and Di Cataldo, 2015) highlight that R&D investment generates both direct productivity and indirect productivity via spill-over effects.

This study is one of the first to quantitatively assess the effects of cohesion policy funding on total factor productivity at the NUTS-2 level across multiple post-socialist countries. By incorporating regional absorptive capacity into the analysis, it also highlights a critical factor that has often been overlooked in previous evaluations of EU Cohesion Policy.

2.2.2. Convergence Theory

Stemming from Solow's neoclassical model, convergence theory posits that poorer regions should grow faster than wealthier regions because of diminishing returns to capital, leading to a convergence of income (Solow, 1956). However, empirical research has identified the importance of conditional convergence, meaning that particular institutional quality, infrastructure, and human capital thresholds must be met to reach convergence (Ederveen et al., 2006; Becker et al., 2018).

(Ederveen et al., 2006) uncovered that EU structural funds are successful in countries that have strong institutions and absorptive capacities. In Czechia, (Crescenzi and Giua, 2020) found stronger effects of the Czech Cohesion funds in urban areas such as Prague and South Moravia, where administrative and innovation capacity are relatively higher. Lastly, in Romania, (Zaharia et al., 2021a) found that economic benefits of convergence were disproportionately located in Bucharest and other metropolitan areas, with rural regions lagging behind due to weaker infrastructure and institutional fragmentation.

This thesis utilizes convergence theory to analyze the spatial distributions of labour productivity, enterprise dynamics, and the entrepreneurial landscape. Rather than relying exclusively on income indicators, it combines firm demography and productivity growth indicators to determine whether convergence across NUTS-2 regional economies is occurring.

2.2.3. Institutional Economics

Institutional economics asserts that not only do resources influence development, but so, too, does the quality of the institutions that matter in a country, e.g., the legal building blocks in place, the regulatory capacity of the country, and its administrative capacity (North, 1990). Even well-designed policy initiatives can fail if key institutions are weak.

The authors (Charron et al., 2014) put it even more sternly, saying that low governance can really degrade policy effect. All three of the countries in this study demonstrate differences in institutional quality in their respective regions: whereas the Czechia's more urbanized areas, e.g., Prague and Brno, score better with respect to planning and coordination capacity. Romania's eastern regions score low on the EU's Quality of Government Index (QoG) developed by (Charron et al., 2014), while bureaucratic corruption has affected Bulgaria's ability to deliver on public procurement contracts and engage in a transparent public procurement process, as reported in (Zaharia et al., 2021b).

In this thesis, GERD and household income are used as more than just economic variables, but also as indicators of institutional and absorptive capacity as part of the explanation of variation in policy outcomes.

2.2.4. Spatial Economics

Spatial economics emphasizes the spatial or geographic aspect of economics, highlighting the role of place, distance, and interregional interaction on economic outcomes (Fujita et al., 1999). Public investments might lead to spillovers that extend from a target area to neighboring areas through worker mobility, supply chains, and the diffusion of knowledge.

There is evidence of equivalent external effects, as applied econometric analysis identified by (Bouayad-Agha et al., 2013) show cohesion funding in French regions demonstrated important external effects. (Fratesi and Perucca, 2020) state the warning that ignoring spatial dependence will potentially lead to biased empirical estimates.

While there has yet to be any studies, specifically on Eastern Europe, that have ex-

PLICITLY used spatial econometrics in their methodologies, a few studies do find that the effects of Cohesion Policy differ significantly depending on the regional context and are sensitive to modelling the spatial heterogeneity. In this regard, the authors' support for entrepreneurial activity in neighboring counties of Cluj-Napoca and the increased labor mobility as a result of Brno's innovation ecosystem performing all across South Moravia reflect the type of spillover dynamics one would expect in light of spatial economics theory.

2.2.5. New Economic Geography (NEG)

The new economic geography of (Krugman, 1991) shows how agglomeration economies, increasing returns to scale, and transport costs organize economic activity over space. Market forces typically push in the direction of agglomeration and reinforce core-periphery dynamics, which can increase regional inequalities without supporting policies.

The EU Cohesion Policy seeks to counter these agglomerative dynamics to connect peripheral regions by building better infrastructure and connectivity. However, (Rodríguez-Pose, 2018) argues that poorly-timed engagement could reinforce agglomerative tendencies by enabling better access of the periphery to core regions without matching local capacities.

Core regions have remained dominant in metrics of innovation and entrepreneurship in Czechia and (Iammarino et al., 2019) show that Bucharest's growth trajectory in Romania has widened territorial gaps.

This thesis assesses whether cohesion funds drive structural transformation in lagging regions based on an analysis of enterprise birth/death ratios and regional economic hierarchies consistent with NEG predictions.

2.2.6. Intersections Among Theoretical Approaches and Implications for Cohesion Policy

While each theoretical framework has its own explanatory power, they are not dichotomous. Rather, they can hold together and convey the inter-related, complex nature of regional development and the multiplicity of EU Cohesion Policy. For example, while endogenous growth theory highlights innovation and knowledge spillovers as the key drivers of long-term growth (Rodríguez-Pose, 2018), institutional economics can outline the governance constraints for initiating such processes by emphasizing regional administrative capacity and the quality of government (Charron et al., 2014).

Convergence theory helps in understanding the long-run convergence of regional economies

but, as noted by the field of spatial economics and New Economic Geography (NEG), supports the possibility of diverging and path dependent processes emphasizing agglomeration dynamics and spatially persistent inequalities in this convergence process (Crescenzi and Giua, 2020). Both perspectives capture the dual nature of the EU where processes of integration and divergence can co-exist

In this thesis, I have sought to combine these perspectives in order to assess the differentiated effects of EU Cohesion Policy in the case of post-transition Member States. This process looked beyond simply inquiring about average treatment effects, instead examining how institutional conditions, regional absorptive capacity and sectoral specialization interacted with policy funding to result in different productivity, employment, and enterprise effects.

This theoretical synthesis is consistent with a growing body of empirical evidence that shows the effects of Cohesion Policy vary not only across regions but also depend on context (Becker et al., 2018). A monetary metric for evaluation fails to capture the ways that impact is mediated by institutions and spatial structure. The point of this thesis is to argue for a multidimensional view of Cohesion Policy — that economic impacts must also be configured within spatial, institutional, and structural asymmetries.

2.3. Empirical Literature on the Impact of EU Funds

The efficacy of Cohesion Policy in the European Union has become an important object of empirical economic research, especially after the enlargement rounds of 2004 and 2007 (Bachtler et al., 2013). The literature contains a large number of studies that measure the impact of EU Structural and Cohesion Funds on regional economic development (focusing on a rich variety of different outcomes), for instance: GDP growth; employment; innovation; entrepreneurship; infrastructure; quality of institutions; and spatial inequality (Piatkowski and Grosse, 2020; Crescenzi and Giua, 2011). In spite of the large number of incursions into the study of EU Cohesion Policy (contrary to other policies such as CAP), The literature appears to be exceedingly varied, reflecting as many methodological approaches, historical periods, and regional disparities (Mendez and Bachtler, 2022).

A variety of impact studies use econometric modelling—fixed effects, GMM, spatial regressions, synthetic control methods etc.—to try to disentangle the causal effects of such funding but the conclusions appear mixed (Becker et al., 2010). While some regions improve significantly in economic performance after the funding and this is statistically significant, others see only modest or non-existent returns. These mixed results

are usually attributed to differences in institutional quality, absorptive capacity, bureaucratic structures and functions and pre-existing conditions, such as regional inequality (Rodríguez-Pose, 2013a).

In addition, a range of meta-analyses (Becker et al., 2010) and (Mohl and Hagen, 2010) indicate that EU funds are more effectively used in regions with efficient governance and development strategies; regions with structural disadvantages or political instability articulate lower moments of return on investment to cohesion spending.

Not only has there been a development of the literature from aggregate impacts to those impacts being measured at sectoral or group levels, i.e. EU funding impacts on innovation in small and medium businesses, labour market outcomes for young people or women, or the uptake of environmentally sustainable infrastructure, but there is more interest in understanding spillovers between regions, frequently across borders, or in polycentric urban systems (Fratesi and Perucca, 2019a).

This study is presented in the context of the 2014–2020 programming period, which coincides with the EU’s most recent completed financial programming framework. Compared to previous programming cycles, this period resulted in enforceable conditions for economic investment, with increased emphasis on thematic concentration, performance-based budgeting, and a requirement for programming to link strategy back to Europe 2020 (Commission, 2020). The empirical literature reviewed in this study is evaluated in light of the evolution of related policies and programs. The literature review in this section is organized thematically with a focus on the empirical literature on EU fund impact. It includes a number of studies in the contexts of Czechia, Romania, and Bulgaria—the post-socialist transition economies with significant transfers from the EU and substantial regional inequality within the countries. The goal of this review is to assess consistent empirical patterns, examine the reliability of the results under different model assumptions, and develop an overall understanding of the conceptual framework of the econometric method undertaken for the purposes of this dissertation.

2.3.1. Assessing EU Cohesion Policy in Less Developed Regions

Early empirical assessments of Cohesion Policy focused specifically on Objective 1 regions¹, areas that qualify for support from the EU structural funds because they have a GDP per capita below 75% of the average GDP per capita in the EU (European Com-

¹Objective 1 regions are defined as NUTS-2 areas with a GDP per capita below 75% of the EU average. During the 2000–2013 programming periods, nearly all regions in Bulgaria and Romania, as well as several in Czechia, Poland, Hungary, and the Baltic States, were classified under this category.

mission, 2022b). These regions accounted the majority of the funding and, particularly in the early programming periods, their absolute amount of structural fund receipts was expected to dwarf the other regions receiving structural funds. (Becker et al., 2010) has undertaken a study that highlights the amount of attention that the regions in Objective 1 receive (and that it can be cited widely) as essentially based on fixed-effects panel models, and discovered statistically significant and positive impacts on regional GDP growth over their study period of 1989–2006. For some of these impacts to be relevant, (Becker et al., 2010) highlight that the institutions, absorptive capacity and pre-existing socio-economic situation were to be fundamental causal mediating factors, as opposed to suggesting the EU transfers were the only influences. These conclusions have faced criticism, giving rise to an alternative school of thought.

As a contrasting viewpoint, (Boldrin and Canova, 2001) in their study found in their critique that cohesion money represented often an economic shock in the short term from public investment in a very strategic and limited time horizon for structural change. They claimed that support had transfer impacts but that there would be no long-term outcomes to support true structural change. They claimed the EU clearly identified they were interested in physical build-outs of nations without directing funding at areas of higher impact like productivity, education or innovation.

The growing literature has increasingly recognized the variation that exists among regions in the Objective 1 category. In Czechia for example, Moravia-Silesia and Ústí nad Labem received substantial EU funding than the regions of Prague and South Moravia, yet (Crescenzi and Giua, 2016) found that productivity growth in these regions lagged behind those areas, even though all were allocated similar amounts of funding. This implies that whether regions develop is influenced both by the level of funding received and the absorptive conditions, which covers the various factors that can influence the engagement processes and level of professionalism in those regions' public administration and policy coherence.

The emerging dynamics were similar in Romania and Bulgaria, where (Zaharia et al., 2021a) identified that eastern Romania and southern Bulgaria received significant amounts of cohesion funded investments, particularly into transport and basic infrastructure, but achieved minimal employment or productivity gains. The authors identified this was likely linked to low physical administrative capacity and poor levels of entrepreneurial dynamism, which confirmed that context specific institutional capacity is an important consideration in the effectiveness and ineffectiveness of policy.

In addition to this, (Rodríguez-Pose and Fratesi, 2004) state that the spatial dimension

of structural funds (namely, the ex-ante allocation of those funds) to an extent needs to account for the existence of regional development traps. Some poorer or weaker regions may remain locked in low-growth equilibria regardless of the number of times they benefit from public investment. The literature considered here supports the general idea of this thesis which takes into account the implications of EU funds, but in the various contexts of institutions, and socio-economic status.

This thesis contributes to the literature by using regional-level controls for measures of governance quality, GERD (expenditures on R&D), and household income. By considering structural asymmetries, the empirical model aims to produce a more nuanced and context-sensitive understanding of Cohesion Policy funds at the NUTS-2 level in Czechia, Bulgaria, and Romania. In addition to the regional analysis, this thesis includes a national level of analysis to facilitate comparisons of national trends and subnational policy outcome variations.

2.3.2. Spatial Models and Lagged Effects

Beyond immediate and direct impacts, more recent strands of empirical research have increasingly examines the spatial and temporal diffusion mechanisms through which EU Cohesion Policy generates regional development (Fratesi and Perucca, 2019a). These models rest on the idea that economic growth and productivity gains do not occur in isolation but often spread across geographic space through interregional spillovers. Such spillovers may arise from labor mobility, trade linkages, knowledge diffusion, and shared innovation systems, especially in functionally integrated regional networks.

Studies employing spatial econometric methods—such as spatial lag models (SAR), spatial error models (SEM), and spatial Durbin models (SDM)—demonstrate that regions receiving structural funds may positively influence neighboring areas, even if those areas do not receive substantial funding themselves (Bouayad-Agha et al., 2013; Zaharia et al., 2021a). This is particularly relevant for Central and Eastern European countries, where urban growth poles like Prague, Brno, Cluj-Napoca, and Sofia tend to exert gravitational economic effects on adjacent, less-developed regions.

In Czechia, for example, RIS3-aligned investments in Brno’s innovation and research infrastructure have been linked to not only economic expansion within South Moravia but also increased entrepreneurial activity, firm births, and labor mobility in neighboring regions such as Zlín and Pardubice. Likewise, in Romania, digital transformation initiatives centered in Cluj-Napoca have facilitated the proliferation of IT-related enterprises in surrounding counties such as Bistrița-Năsăud and Mureș, suggesting that cohesion-funded

development in metropolitan cores often radiates outward.

Despite their theoretical appeal, spatial spillovers continue to be an empirically challenging measurement due to data limitations and endogeneity issues (Camagni and Capello, 2015). Most researchers use long-term panel datasets and indirect measures (e.g., commuting flows, business registration, and regional export volumes) to proxify spatial interdependence. Nonetheless, there is now more evidence that neglecting these dynamics may lead to an under-estimation of the effect of policies of funds lost to time.

Temporal dynamics are an important aspect of empirically determining the impact of EU funding. Many of the investments of infrastructure, education, and innovation require time before the effects can be observed. The delayed effects can also be labeled as lagged effects, which can be modeled by time-lag structures of empirical specifications. Time-lag structures are important precisely as they can counter simultaneity bias, giving and capturing directionality of causation from investments to development (Becker et al., 2010).

In this vein, this thesis applies a one-year lag structure for EU funding variables at the NUTS-2 regional level. This design choice is supported by previously conducted empirical studies (Becker et al., 2010; Bouayad-Agha et al., 2013), which note that countries receive structural cohesion policy, sometimes with effects appearing 1–3 years post investment. Moreover, the selection of lagged variables reflects the institutional and administrative reality that funding absorption, project implementation, and outcome realization are not immediate.

In terms of time and space, for example, there is association development of research and transport infrastructure in Brno with improved business mobility and startup activity in neighboring areas in the following years. Likewise, Romania's regional statistics suggest that the investments in Cluj-Napoca's digital infrastructure that were made at the start of the funding cycle match increased levels of firm creation and employment in nearby counties two to three years later.

In short, the empirical model design of this thesis has direct consideration of both dimensions of spatial and temporal duration. By employing lagged EU funding ($t-1$) at the regional level only, the examination is consistent with the theoretical expectations of policy impact diffusion to neighbouring and adjacent regions while increasing the ability to identify delayed and cross-regional policy effects within the initially intended territories and beyond. The lag structure is not implemented in national-level models because the panel dimension in time is only limited in structure and the number of countries is small, thus producing a small number of observations. This limits the statistical reliability with

lagged specifications on the national level. Nevertheless, the methodical rationale for justifying this decision and its potential consequences will be examined in more detail in the empirical results section. To clarify that the lag structure is applied only at the regional NUTS-2 level, while national level funding is contemporaneous (t) across all models and specifications as it relates to funding effect transmission only at the macroeconomic and budget levels.

2.3.3. Temporal and Geographic Heterogeneity

The economic effects of EU Cohesion Policy are not uniform over space and time. A growing number of studies highlight that the impact of regional funding is contingent not only on the volume of funding available, but also the specified temporal period of policy implementation and the structural characteristics of the regions receiving funding (Fratesi, 2020). This means evaluations of cohesion policy must consider both temporal heterogeneity (spatial heterogeneity reflects variance in programming priorities over time) and geographic heterogeneity (regional differences attributable to institutional capacities, economic structure, and absorptive capacity) (Bachtler et al., 2017).

The temporal variability is most evident in the changing strategic priorities of EU Cohesion Policy formulation among successive multiannual programming periods. For example, during the 2000–2006 and 2007–2013 programming periods, policy essentially directed funding towards physical infrastructure, connectivity, and regional accessibility. Conversely, programming for the 2014–2020 period signified a shift towards smart specialization, innovation, and social inclusion, while the current 2021–2027 procedural framework intends to focus on delivering green and digital transitions in support of the European Green Deal (Mendez and Bachtler, 2022).

Changes in formal and accepted programming priorities dictate not only where funding is directed, but also the leads-out expected from investment interventions. The empirical evidence supports these above assertions. (Mohl and Hagen, 2010) using fixed-effects panel models of 25 EU countries from 2000 to 2006 demonstrated that the economic growth effects of EU funding were strongest during the initial moving parts of the investment, but weakened after that stage due to diminishing marginal returns. They found that misalignment of social-economic goals between EU funding and the stated objectives for the national or regional plans substantially lowers the effectiveness of funding programs, underscoring the importance of institutional match-fit.

Geographic heterogeneity is another crucial aspect of evaluation of Cohesion Policy. In Spain, (Ramajo et al., 2008) have shown by studying NUTS-2 regions that the same

EU funding levels can lead to very different outcomes, only due to regional structural characteristics including population density, human capital, industry composition, and administrative quality. As a result, regions with greater education, urbanization, and more robust innovation ecosystems were better able to convert funding into long-term economic gain than the rural or structurally disadvantaged regions.

Czechia provides a relevant case study. The capital region of Prague has very strong administrative capacity, along with a well-developed infrastructure of innovation, which allows for strategic application of EU funding and absorption of EU projects. Regions undergoing industrial transition, such as Olomouc or Moravia-Silesia, have considerable challenges in regard to alignment of projects, and absorption of varied EU funding. Similarly, in both Bulgaria and Romania, the capital cities of Sofia and Bucharest have consistently outpaced peripheral and rural provinces in the amount of funding utilized and disbursement of outputs.

Furthermore, interregional differences stem not only from institutional or economic differences, but also from funding in select priority areas. Some regions allocated EU resources to social infrastructure and education, while others allocated funding to transport, energy and technology. The differences in allocations have profound impact on the extent and timing of measurable outputs.

By using country and year fixed effects it explicitly adjusts for both time and geographical heterogeneity. This methodological framework enables more valid attribution of economic impacts (i.e. GDP growth, changes to employment, and productivity changes) to EU funding interventions while controlling for time-invariant regional characteristics and country wide time shocks. This contextualized, regionally-sensitive design aligns with recent progress in empirical cohesion policy research and supports inferential credibility.

2.3.4. Country Cases: Czechia, Romania, and Bulgaria

Country-specific empirical studies provide an essential understanding of how EU structural and cohesion funds operate under different institutional frameworks and socio-economic circumstances. Although cohesion policy operates under a common set of European objectives, the way it is executed and its effects can differ considerably across members, and particularly among post-socialist countries that became EU members during the waves of enlargement in 2004 and 2007 (Bachtler et al., 2013).

(Crescenzi and Giua, 2016) conducted a study of Czechia at the regional level, which found that regions with more human capital and innovation capacity in Czechia—which were chiefly concentrated in Prague and South Moravia—exhibited much stronger gains

in total factor productivity (TFP). These regions had the ability to not only formulate and carry out an ambitious and integrated strategic project and absorb relatively large funds expertly but also had the capability to embed innovation-driven activities. Correspondingly, regions of structurally lower human capital and innovation capacity—like Ústí nad Labem or Karlovy Vary—attained small productivity gains limited to those represented in the 1996–2006 block development projects. These weak regions maintained relatively stripey outcomes due to weak institutional structures and policy anchoring with EU strategic objectives.

Romania and Bulgaria, which also have important regional divides and institutional fragmentation, have produced more mixed results. (Zaharia et al., 2021a) pointed to a slow and uneven structural transformation process in both countries. Romania showed that the Bucharest–Ilfov region disproportionately took large numbers of cohesion resources, as well as high growth in sectors like IT, and services. Conversely, lesser economically developed areas such as Moldova and South-West Oltenia, were unable to absorb these funds due to low administrative capacity, lack of project planning skills/capacity, and also local co-funding capacity.

With Bulgaria, the document highlighted how the Southwest region, including Sofia, had greater institutional presence and better economic sectors with more diversity which produced more quantifiable results with EU funding. On the other hand, in southern and rural Bulgaria, such as in South Central and South-East, we saw not only delays in delivery, but weak private sector engagement, slow implementation, and poor monitoring (Monastiriotis, 2014).

These heterogeneous country experiences, expressed on regional terms, give firmer support to this thesis’s view of evaluating cohesion policy impacts at the national and sub-national level. By highlighting economic indicators such as TFP, firm dynamics, and employment, the analysis captures how differences in absorptive capacity, governance quality, and structural conditions are reflected in the economic outcomes of EU-funded interventions. In addition, by including regional fixed effects in the econometric models, the analysis controls for country-specific institutional characteristics while addressing within-country variation.

2.3.5. Conditionality and Governance Quality

Governance quality has emerged as one of the most critical determinants of cohesion policy effectiveness. Although EU funds aim to reduce regional disparities through investment in infrastructure, human capital, and innovation, the actual translation of fund-

ing into tangible outcomes is strongly mediated by institutional capacity, accountability mechanisms, and administrative efficiency at both national and subnational levels.

(Rodríguez-Pose and Fratesi, 2004) argue that weak governance structures can fundamentally undermine the potential of EU funds, resulting in inefficiencies, delays, and suboptimal project implementation. Regions characterized by limited transparency, poor public service delivery, and fragmented administrative systems are often unable to absorb or effectively utilize the allocated resources. These governance failures lead to what scholars term “institutional traps,” where public investment fails to stimulate inclusive growth or long-term development.

In order to better measure such institutional variation, (Charron et al., 2014) developed the Regional Quality of Government Index (QoG), which evaluates subnational governance performance across dimensions such as impartiality, corruption control, and rule of law. According to this index, regions in Eastern Romania and northwestern Bulgaria score among the lowest in the European Union, indicating persistent weaknesses in administrative quality. In contrast, regions in Czechia—especially Prague and South Moravia—demonstrate higher institutional capacity and better governance metrics.

These empirical findings align with the broader literature suggesting that cohesion funds yield stronger effects in regions where governance conditions are conducive to policy execution (Fratesi and Wishlade, 2017). Moreover, conditionality mechanisms introduced in recent programming cycles aim to reinforce institutional quality through ex-ante conditionalities, performance frameworks, and stronger monitoring systems. These mechanisms link funding access and disbursement to concrete institutional reforms and strategic planning obligations.

In line with this theoretical foundation, the econometric models in this thesis include control variables that act as proxies for institutional and administrative effectiveness. Gross domestic expenditure on R&D (GERD) is used not only as an indicator of regional innovation capacity but also as a reflection of strategic planning and public-private cooperation. Similarly, household income per capita serves as a proxy for local economic structure, public service efficiency, and regional welfare—all of which are closely linked to governance performance.

By accounting for these governance-related controls, the thesis seeks to disentangle the pure effect of EU funding from the influence of local institutional capacity. This approach enhances the internal validity of the empirical analysis and aligns with recent methodological trends in the evaluation of EU cohesion policies.

2.3.6. Entrepreneurship and Innovation Indicators

A growing body of research investigates the role of EU funds in promoting entrepreneurship and regional innovation capacity. Beyond traditional growth indicators such as GDP and employment, recent studies highlight the importance of firm dynamics—particularly firm births, deaths, and survival rates—as proxies for economic adaptability, innovation potential, and entrepreneurial ecosystem strength (Audretsch and Fritsch, 2002a; Stangler and Litan, 2009).

Recent evidence from Romania suggests that EU-funded entrepreneurship support schemes have contributed to increased firm creation rates among youth and women, particularly in urban centers such as Cluj-Napoca. Programs co-financed by the European Social Fund (ESF+) have supported digital entrepreneurship training, micro-grants for startups, and inclusive business incubators aimed at improving labor market integration and gender equality (Zaharia et al., 2021a).

Similarly, (Ciani and Imbrogno, 2022a) found that ERDF investments had a positive effect on regional R&D expenditures, particularly in regions aligned with the EU's smart specialization strategies (RIS3). Their findings suggest that EU funds can be catalytic in fostering both innovation inputs and entrepreneurial outputs when embedded in coherent regional strategies.

In Czechia, the city of Brno presents a notable case. With strong institutional support and RIS3 coherence, Brno experienced a doubling of high-tech startup activity between 2015 and 2020, driven by ERDF-funded innovation hubs such as CEITEC (Central European Institute of Technology) and JIC (South Moravian Innovation Center). These institutions have played a critical role in facilitating public-private partnerships, seed funding, and incubation for science-based ventures. Conversely, structurally weaker Czech regions such as Ústí or Karlovy Vary have seen limited entrepreneurial momentum despite similar funding eligibility (Crescenzi and Giua, 2016).

In Romania, Cluj-Napoca has emerged as a digital entrepreneurship hub, benefiting from ERDF-backed infrastructure and human capital investments. However, this trend has not been mirrored across other Romanian regions, where low absorptive capacity and fragmented innovation networks limit the spillover potential of EU interventions (Zaharia et al., 2021a).

Building on this literature, the present thesis uses firm births as a primary dependent variable to evaluate the localized impact of EU funding on regional entrepreneurial dynamism. In addition, firm deaths and the number of active enterprises are used as

components in the construction of derived indicators—such as business growth rates and birth-to-death ratios—that reflect the structural health and renewal of regional economies.

These indicators help capture the dynamic responsiveness of local economies to investment stimuli, going beyond static output measures. By incorporating these innovation-sensitive indicators into the empirical analysis, this thesis contributes to a more granular understanding of how cohesion policy shapes regional entrepreneurial ecosystems within the diverse institutional contexts of Czechia, Romania, and Bulgaria.

2.3.7. General Evaluation and Simulation Models

Meta-analyses and simulation models provide a wide-ranging strategic understanding of evaluating EU Cohesion Policy effectiveness. While econometric studies use past behaviour and past data to value actual outcomes, simulations allow researchers and policy-makers to understand how the cohesion investment might make a difference under different investment context, institutional settings, and policy mixes (Postuła and Janusz, 2021).

For example, the European Commission’s Directorate-General for Regional and Urban Policy (DG REGIO) has developed a specific simulation frameworks—RHOMOLO—which is a spatial computable general equilibrium (SCGE) model. The simulation framework runs models through regions and sectors to project the impact of cohesion policy investments on employment, GDP, productivity, and consumption through time and space (European Commission, 2018). These models, like RHOMOLO, involve multiple assumptions and simplifying circumstances, but can help identify opportunity costs, sectoral trade-offs, and indirect effects that are often hard to capture with empirical data.

(Bachtler et al., 2013) highlight that simulation frameworks should not replace econometric analysis but rather work complementarily in a strategic foresight planning construct. They argue that they are invaluable for understanding long term spatial dynamics, intra-regional interconnectedness, and fund allocation system characteristics. However, they also previously caution that models can be heavily reliant upon the base assumption(s) and often overlook the complexity of policy formulation going forward.

Meta-analytical narrow studies also provide a more integrated view of cohesion policy effectiveness in relation to contextual factors.(Postuła and Janusz, 2021) conducted a rigorous meta-analysis of more than 50 empirical studies and reported that effect sizes for cohesion policy were in the range of 0 to 3% of GDP contingent upon institutional capacity, coherence with national strategies and the quality of the policy design. Their results support the idea that cohesion policy effects are not only contingent on the amount of funding provided but also very much context-specific.

This thesis is consistent with the multidimensional rationales offered by both simulation-based studies and meta-analytical studies. The empirical strategy in this thesis combines more than one relevant economic outcome variable, including GDP; employment; total factor productivity (TFP); and business turnover. Such an approach increases the robustness of the analysis and helps capture the composite character of the regional development process; it also recognizes the partial, lagged and indirect EU intra-regional effects of cohesion investments that might appear in different forms in different regions, over time.

2.3.8. Regional Resilience and Crisis Response

Cohesion Policy, therefore, not only encourages long-term growth but also acts as a macro-regional stabilizer during crises. In instances of asymmetric economic shocks, EU funds have been deployed to help cushion against social and economic dislocations, mainly in regions that are structurally vulnerable.

According to (Fratesi and Rodríguez-Pose, 2016), cohesion funding played a role in mitigating job losses in the most exposed regions in the wake of the global financial crisis in 2008, particularly where there was little national capacity to stabilize things. They concluded that if EU investments take place at an optimal time and are targeted, then they may function in a counter-cyclical manner to provide a buffer for regional economies when they encounter downturns.

A more recent example is the REACT-EU (Recovery Assistance for Cohesion and the Territories of Europe) initiative, which was initiated as part of the EU's response strategy to COVID-19. REACT-EU focused on support for healthcare systems, digitalisation, and the resilience of small and medium-sized enterprises (SMEs). (European Commission, 2021a) outlined potential support for Member States such as Romania, Bulgaria and Hungary, where issues related to regional disparity and gaps in healthcare infrastructure were more acute.

In Czechia, cohesion policy funds were complementing flexible labor market policies on a national level. The investments were focused on digital public service, remote work infrastructure, or vocational training programs. However, there was a substantial gap in absorption capacity between urban and rural areas, which highlighted structural constraints and the uneven speed of recovery for subnational regions.

These observations are consistent with existing literature on regional resilience that highlights the importance of adaptive capacity, institutional flexibility and coordination of policies when responding to crises (Bristow and Healy, 2014a). EU cohesion instruments have increasingly incorporated these principles as we shift from policy frameworks that

prioritize growth, toward resilience oriented frameworks.

In keeping with this evolving role, this thesis includes employment levels, unemployment rates, and firm births as key variables to understand the shock absorbing capacity of cohesion policy. The purpose of these variables is to know if EU funds supported economic stabilization for these regions in the face of external crises, especially for those regions in Czechia, Romania, and Bulgaria that were structurally vulnerable and uneven in their recovery.

2.3.9. Role in Green and Digital Transitions

The 2021–2027 EU Cohesion Policy programming period displays a clear shift, or re-orientation, towards transformational objectives. Over 30% of cohesion funds are required to be dedicated to climate action, renewable energy, and environmental sustainability; and at least 20% must be devoted to supporting digital infrastructure, digital public e-services, and digital accessibility (European Commission, 2021b). As (Mendez and Bachtler, 2022) highlight, this demonstrates a shift in cohesion policy from a mainly redistributive policy to one of strategic value in terms of structural transformation and long-term resilience.

The shift in policy is reflected in national and regional national investment strategies of Member States. For example, Bulgaria's "Clean Air Sofia" initiative promotes sustainable mobility through electric vehicle infrastructure and air quality monitoring. Romania is undertaking extensive digital reforms within public administration and health care including digitizing hospital records in about 50% of public institutions. Czechia has RIS3-related projects focused on smart transport systems, e-government platforms, and modernized digital public services (World Bank, 2022).

These initiatives not only match the aims of the Green Deal and the Digital Europe programme, but also reflect the increasing emphasis on cohesion funding for technological and environmental advances in lagging regions. Nevertheless, assistance and effectiveness of investments will remain contingent on administrative capacity, local absorptive capacity and private sector facilitation (Bachtler and Mendez, 2016).

2.3.10. Learning Effects in Post-2004 Member States

The EU enlargement post-2004 welcomed a substantial number of Central and Eastern European countries, such as Czechia, Romania, and Bulgaria. Many of the understatement countries faced challenges and obstacles to fund absorption, project design, administrative processes, and EU compliance during the early programming periods, alongside

many others. Over time, awareness, institutional learning and policy adjustment contributed positively to increasing implementation efficiency (Piatkowski, 2018).

(Piatkowski, 2018) and (Radosevic and Yoruk, 2013) documented learning effects in support of proposal proposal, positing the concept that countries like Poland and Czechia could develop more complex governance systems leading to absorption rates incrementally rising. The majority of Czechia early-stage cohesion funding went towards basic infrastructure projects. This shifted into interventions favouring innovation-oriented and RIS3 relevant projects, researched undertaken in 2014–2020 included: investing in research, smart transport, digital public services and a wide range of other projects.

While Romania and Bulgaria continue to struggle with huge administrative inefficiencies, specifically in peripheral regions with little institutional capacity. Issues related to the preparation of projects, quality control and ex-ante evaluation are common problems, and many cohesion financing dates went unreleased because a determination was not made about negativity affecting the strategic value proposition of cohesion investments. However, even in this context learning effects can be observed in terms of widening stakeholder collaboration in their plans, expansion to technical assistance and moving towards more incremental.

The idea of "policy learning" in the cohesion context includes technical and administrative improvement; strategic direction change; monitoring capacity change; and horizontal coordination between different tiers of government (Bachtler and Mendez, 2016). Such changes are crucial in achieving an alignment of EU priorities with national development strategies and the transformational capacity of EU funding.

To account for the above, this thesis has a temporal aspect by focusing specifically on the programming period of 2014–2020. This programming period allows us to observe varying effects of policy learning through the policy cycles, which emphasizes change is related to the early-stage challenges and more mature actualisation of implementation, and to draw time-based comparisons to accommodate changing institutional learning or institutional absorption capacity, not only in terms of Czechia, which has demonstrated strong improvement capacities and learning stability, but also in terms of Romania and Bulgaria, which have persistent limits of structural learning and absorption capacities.

The empirical strategy also allows us to acknowledge both cross-country differences and temporal variations in terms of administrative readiness, and policy maturity.

3 | Methodology

This chapter outlines the methodological framework employed to assess the economic impact of EU Cohesion Policy funds in Czechia, Bulgaria, and Romania between 2014 and 2020. The research applies fixed effects panel regression models to capture both temporal and spatial variation in economic performance. Emphasis is placed on the construction of harmonized datasets, the definition and operationalization of key variables, and the justification of control variables based on both theoretical reasoning and empirical evidence. By doing so, this chapter establishes the empirical foundation necessary to explore the pathways through which cohesion funding affects development outcomes across diverse economic and institutional settings.

3.1. Research Design

This thesis adopts a quantitative and observational research design to analyze the impact of European Union (EU) Cohesion Policy funds on economic development. The research focuses on three post-socialist EU Member States—Czechia, Bulgaria, and Romania—that have undergone profound economic transformations since their accession and have received substantial cohesion funding during the 2014–2020 programming period.

The main objective is to empirically examine the relationship between EU funding and key economic performance indicators at both the national and regional (NUTS-2) levels through rich econometric specifications employing fixed effects and lagged models. These indicators include GDP, employment, gross fixed capital formation (GFCF), enterprise births, enterprise deaths, and active enterprises. Labor productivity, total factor productivity (TFP), enterprise growth rate, and the enterprise birth-to-death ratio are used as derived variables. TFP is measured using two approaches: one based on capital and labor inputs via the Cobb-Douglas production function, and another using HRST as a proxy for knowledge-based productivity.

This analysis allows the study to capture both aggregate macroeconomic effects and more localized regional dynamics, offering a nuanced understanding of the structural

impacts of cohesion funding.

The empirical strategy is grounded in panel data regression models with fixed effects, which are widely used in regional development literature (Ederveen et al., 2006); (Becker et al., 2010). This method offers significant advantages, such as controlling for time-invariant unobserved heterogeneity across countries and regions, isolating temporal changes, and enabling more robust empirical analysis.

At the regional level, both the independent variable (EU funding) and control variables (GERD and household income) are lagged by one year ($t - 1$), to account for the well-documented time delay in the absorption and economic impact of EU funds (Bouayad-Agha et al., 2013; Mohl and Hagen, 2010). At the national level, current-year values (t) are used, reflecting more immediate transmission mechanisms through national budgets, investment channels, and fiscal multipliers.

This thesis is taking a multilevel analytic approach to look at how European Union funds influence economic development at the national and regional levels. The two levels are examined using the same economic indicators; however, the interpretation of the results is based on different mechanisms per level.

At the NUTS-2 regional level, the model assesses regional effects based on multiple factors, but within a strictly local framework. Here the constructors of the NUTS-2 regional model emphasized absorptive capacity, institutional qualities and project implementation processes. The analytic approach for this level of evaluation is structured towards the local level to best assess interregional gaps and development.

Conversely, the national level model presents analysis on structural factors such as the factor of EU funds on public budgets, public investment and macroeconomic stabilization of governments. This analysis repositions the overall influence of EU funds on country-based economic development.

3.2. Data Sources

This study's empirical analysis has relied only on information of a kind issued officially and internationally, thus maintaining consistency, transparency, and the ability to compare across countries. All monetary amounts were expressed in million euros, and employment and firms were expressed in million persons or firms. The dataset was constructed in Stata with careful attention to temporal structure and unit consistency.

The study encompasses the 2014–2020 programming period and has national- and

NUTS-2-level indicators. The data has been sourced from the following key data sources. Eurostat served as the main provider of regional-level economic data. Key indicators include regional GDP, employment, household income, gross fixed capital formation (GFCF), gross domestic expenditure on R&D (GERD), and enterprise dynamics (births, deaths, and active enterprises). Kohesio, developed by the European Commission, was used to extract aggregated annual funding amounts at the NUTS-2 regional level. Instead of focusing on micro-level project data, the study relies on total annual allocations to assess structural impact. The Cohesion Open Data Portal (CODP) provided national-level data on annual fund allocations, payment progress, and implementation timelines. OECD Regional Statistics were used as a complementary source, particularly for gross fixed capital formation (GFCF), which was needed for Total Factor Productivity (TFP) estimation.

All variables were harmonized and organized into a balanced panel structure. Derived indicators include labor productivity (GDP per employed person), enterprise growth rate (births of enterprises / active enterprises), enterprise birth-to-death ratio (as an indicator of entrepreneurial dynamism), and Total Factor Productivity (TFP). TFP was calculated for both national and regional levels using two alternative approaches: one based on the Cobb-Douglas production function using capital and labor inputs, and the other using HRST (Human Resources in Science and Technology) as a proxy for knowledge-based productivity.

3.3. Variables and Definitions

This study employs a panel dataset containing macroeconomic and regional indicators to examine the impact of EU Cohesion Policy funds on economic development in Bulgaria, Czechia and Romania during the 2014-2020 programming period. The selection of variables is based on theoretical models of regional growth and empirical studies on cohesion policy effectiveness (Becker et al., 2018; Crescenzi and Giua, 2020).

In total, there are three groups of variables: (1) dependent variables capturing economic performance, (2) a single key independent variable representing EU funding, applied as lagged at the regional level and contemporaneous at the national level, (3) control variables capturing relevant socioeconomic situation for regional development.

It is important to clarify that the HRST (Human Resources in Science and Technology) variable, although employed in the estimation of Total Factor Productivity (TFP) as an alternative proxy for intangible, knowledge-based capital, was not included as a control variable in any of the regression models. The only control variables used consistently across regional and national specifications were Gross Expenditure on R&D (GERD) and

household income. This distinction ensures that the methodological role of HRST is limited to productivity estimation, without influencing the explanatory structure of the empirical models.

3.3.1. Dependent Variables

A comprehensive set of dependent variables is used to capture multiple dimensions of economic performance at the national and regional levels. These indicators are consistent with previous evaluations of cohesion policy outcomes and growth modeling frameworks (Mohl and Hagen, 2010; Bouayad-Agha et al., 2013).

Gross Domestic Product (GDP), measured in million euros, is the key measure of economic output. Regional data are sourced from Eurostat. Employment, expressed in million persons, represents the size of the active labor force. It is crucial to assess labor market impacts of structural interventions (Ederveen et al., 2006). Labor Productivity, defined as GDP per employed person, reflects the efficiency of labor input and is often associated with infrastructure quality, investment, and innovation (Pellegrini et al., 2013).

Total Factor Productivity (TFP) is calculated using two methods. Method 1 applies a Cobb–Douglas production function:

$$TFP = \frac{GDP}{K^\alpha \cdot L^{1-\alpha}}, \quad \text{where } \alpha = 0.3$$

with K representing Gross Fixed Capital Formation (GFCF) and L representing employment. Method 2 substitutes capital input with HRST (Human Resources in Science and Technology), aligning with endogenous growth theories that emphasize human capital as a productivity driver (Romer, 1990).

Enterprise Growth Rate is calculated as the ratio of enterprise births to the number of active enterprises in a given region. This variable captures the expansion potential and entrepreneurial intensity of the local economy (European Commission, 2017). Enterprise Birth-to-Death Ratio is defined as the ratio of business births to business deaths. This indicator reflects the renewal dynamics and resilience of the enterprise ecosystem, with values above one indicating net entrepreneurial expansion (Audretsch, 2005).

3.3.2. Independent Variable

The primary independent variable for this study is total annual amounts of EU Cohesion Policy funding that were allocated to countries and regions in the 2014–2020 Programming Period.

The funding amount included allocations from each of the three primary funds included within the Cohesion Policy: the European Regional Development Fund (ERDF); the European Social Fund (ESF); and the Cohesion Fund (CF). These funds aim to assist regions with development potential to realize their IFC (increasing infrastructure capacity) by promoting regional development, increasing the infrastructure capacity to promote regional development, providing opportunities for social inclusion, and improving or allowing access to employability in less developed and transition regions in the EU.

Data on annual allocations were obtained from two official sources. Kohesio, developed by the European Commission, provided regional-level aggregated funding data for cohesion policy funds across NUTS-2 regions. The Cohesion Open Data Portal (CODP) was used for national-level allocation data, absorption ratios, and implementation progress across all three funds.

To reflect the temporal structure of policy impact, the funding variable is included in lagged form ($t-1$) in regional-level models, in line with studies highlighting absorption and implementation delays (Bouayad-Agha et al., 2013). For national-level regressions, the funding variable is applied using current-year values (t) to capture immediate macroeconomic linkages.

EU funding is conceptualized as an external investment impulse that can trigger improvements in output, productivity, and business dynamics through financial support for capital formation, human resource development, and institutional capacity-building (Becker et al., 2018; Rodríguez-Pose and Garcilazo, 2015).

3.3.3. Control Variables

To avoid omitted variable bias and improve inference quality, the models include two key control variables that are empirically linked to regional development outcomes.

The first is GERD (Gross Expenditure on R&D), measured in million euros, which reflects regional innovation capacity and R&D effort. Regions with stronger innovation systems are typically better positioned to utilize EU funds effectively (Rodríguez-Pose and Garcilazo, 2015). The second control variable is Household Income, which represents the average household income per region or country and captures consumption capacity, living standards, and welfare disparities (Crescenzi et al., 2020).

Both control variables are included in lagged form ($t-1$) for regional-level regressions to account for delayed effects, and in contemporaneous form (t) for national-level models.

3.4. Empirical Model Specification

To evaluate the effects of EU Cohesion Policy funds on economic performance, this study estimates two separate fixed effects panel models: one at the regional (NUTS-2) level and one at the national level. The models are designed to account for unobserved heterogeneity across regions or countries and temporal shocks common to all units. Fixed effects estimation is used to control for time-invariant structural characteristics and isolate within-unit variation over time.

3.4.1. Regional-Level Model

The regional model is specified as follows:

$$Y_{irt} = \alpha + \beta_1 \cdot \text{Funding}_{ir(t-1)} + \beta_2 \cdot \mathbf{X}_{ir(t-1)} + \mu_r + \lambda_t + \varepsilon_{irt}$$

The variables are defined as follows: Y_{irt} represents the regional-level outcome variable (e.g., GDP, employment, TFP, labor productivity, or enterprise indicators) for region r in country i at year t . $\text{Funding}_{ir(t-1)}$ denotes the amount of EU Cohesion Policy funding allocated to region r in country i in year $t - 1$, lagged by one year. $\mathbf{X}_{ir(t-1)}$ represents the vector of lagged regional-level control variables (GERD and household income) for region r in country i . μ_r captures region-specific fixed effects, controlling for time-invariant regional heterogeneity. λ_t captures year fixed effects, accounting for shocks or policies that affect all regions equally in year t . ε_{irt} is the idiosyncratic error term.

This specification captures delayed policy impacts, as EU funds often require time for project planning, implementation, and disbursement. The use of lagged variables reflects findings in prior research (Bouayad-Agha et al., 2013; Mohl and Hagen, 2010).

3.4.2. National-Level Model

At the national level, a parallel specification is used:

$$Y_{it} = \alpha + \beta_1 \cdot \text{Funding}_{it} + \beta_2 \cdot \mathbf{X}_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

The variables are defined as follows: Y_{it} is the national economic indicator for country i in year t , Funding_{it} is the amount of EU funding allocated to country i in year t , \mathbf{X}_{it} includes GERD and household income in current-year values, μ_i are country fixed effects, and λ_t are year fixed effects, ε_{it} is the error term.

Unlike the regional model, funding and control variables are included contemporaneously. This reflects the assumption that national-level funding influences macroeconomic performance more immediately through fiscal multipliers and centralized investment mechanisms (Becker et al., 2018; Rodríguez-Pose and Garcilazo, 2015).

3.4.3. Estimation Strategy

Both of the models use fixed effects (within) estimators. In the case of regional, i.e. NUTS-2 regions, an additional fixed effect for each region per year is included to control for time-invariant, regional characteristics and common time shocks. At the national level, country and year fixed effects are used similarly. Due to the small data set of country-level and region-level panel units, clustered standard errors were not applied to the standard errors. As such, caution must be taken in interpreting the results as estimating the standard errors could be impacted by autocorrelation or heteroskedasticity. Furthermore, the basic model structure itself was intentionally retained, and statistical significance was conservatively interpreted in an effort to maximize the explanations of the findings.

3.5. Justification of Control Variables

The selection of control variables for this study has been based on both theory and empirical evidence. In order to establish and isolate the causal relationship between EU Cohesion Policy funding and economic performance, we need to account for structural characteristics which could, in their own right, determine regional or national development pathways. To this end, it has been decided that Gross Expenditure on R&D (GERD) and Household Income will be maintained in all model specifications as critical control variables.

3.5.1. Gross Expenditure on R&D (GERD)

GERD is a commonly used proxy for a region's innovative capabilities, technological readiness, and knowledge infra-structure. Regions that engage in more R&D, are generally in a much greater position to spend on, and use cohesion funding, particularly when it is directed towards innovation, digitalisation, and smart specialisation. (Rodríguez-Pose and Di Cataldo, 2015) contend that the efficacy of cohesion policy is significantly conditioned on the innovation potential of the agreed region. Likewise, (Becker et al., 2010) explicate that regions with established knowledge ecosystems are better positioned to convert EU spending into long-run productivity gains.

In addition to absorption capacity, GERD reflects endogenous growth potential. Regions that conduct R&D tend to engender positive spillovers in terms of employment, firm competitiveness, and total factor productivity over time. (Crescenzi et al., 2020) observe that knowledge-based regions represent a major contribution to sustainable development through innovation externalities. The GERD as a control variable allows the models to establish diagnostic effects to identify policy outcomes from endogenous regional knowledge outcomes.

3.5.2. Household Income

Household income approximates the socioeconomic welfare and consumption potential of a region or country. It reflects not only the purchasing power of households, but also labor market conditions, fiscal stability, and the distributional dimensions of growth. Higher levels of household income are often associated with stronger domestic demand, a more stable tax base, and more effective institutions—all of which can influence the economic return of public investment.

According to (Barro, 1990), wealthier regions may face diminishing marginal returns to public capital, but they are also more capable of co-financing or complementing EU-funded projects. (Mohl and Hagen, 2010) find that cohesion policy tends to have the strongest impact in regions with moderate income levels, suggesting a non-linear relationship between income and policy effectiveness.

3.6. Country Selection Rationale

The identification of Czechia, Bulgaria, and Romania as the countries to be explored in this thesis is justified theoretically and practically under the European Union's Cohesion Policy. These three countries display salient structural and historical features that promote internal validity for comparisons, but also for variation in context for empirical interpretation, all whilst promoting the idea of a reconciled design founded on comparability and variation for institutional capacity, fund exposure and policy interaction.

Common Transition History and EU Membership all three countries joined the European Union (EU) in large part due to the subsequent enlargement rounds in 2004 and 2007, which can now be seen as an important milestone in the integration of post-socialist economies into the EU institutional system. These countries, following their legacy of centrally planned economies, have undergone a relatively rapid process of liberalization, privatization, and structural change in the 1990s and early 2000s, thereby

providing (Becker et al., 2018) conditions to and promote comparative evaluation of EU cohesion instruments. However, they have also exhibited similar institutional trajectories in embarkation of administrative restructuring, legal harmonization, and regional development policies and frameworks.

During the 2014–2020 programming period, Czechia, Bulgaria and Romania were three of the largest EU recipients of Cohesion Policy funding in ratio to GDP. Utilizing data from both the European Commission and Kohesio, these countries received significant amounts of funding from various cohesion funding streams aimed at infrastructure, innovation, human capital and regional convergence. As the countries with high funding amounts, these countries will allow for extensive evaluation of underlying impacts on economic performance due to their high numbers of intervention and their diversity of funding by all levels of intervention under the European Regional Development Fund (ERDF), European Social Fund (ESF) and the Cohesion Fund (CF). This level of activity provides good opportunity for the determination of impacts of these funding regimes on performance.

Despite having similar structures, these three countries vary in areas of administrative quality, institutional capacity, and regional disparities which are commonly accepted as moderators of EU fund efficacy. In general, Czechia demonstrates better governance, ability with fund absorption, and lower spatial inequality (Charron et al., 2014; Crescenzi and Giua, 2020). In contrast, Bulgaria and Romania are characterized by greater regional asymmetries, and institutional fragmentation distribution and mixed implementation outcomes (Rodríguez-Pose and Fratesi, 2004). Inclusion of these three countries enables this analysis to provide a wider representation of real-world conditions, from relatively successful to more difficult cohesion policy environments.

In addition to the contextual and institutional reasons discussed above, a primary consideration from a methodological point-of-view in selecting the group of countries was the availability of quality and comparable data at the NUTS-2 level. From existing open data sources available through Eurostat, Kohesio, and the Cohesion Open Data Portal, we can use multiple indicators of regional economies—GDP, employment, number of businesses, gross domestic expenditures on research and development (GERD), household disposable income, and European Union (EU) funding—and these indicators are consistently available in all three countries.

3.6.1. Case Selection Rationale

The selection of these three countries offers both analytical richness and methodological consistency. Their shared post-socialist transition ensures coherence for comparative

analysis, while their divergence in governance, absorptive capacity, and regional inequality creates valuable variation for causal identification. This combined structure supports both empirical depth and policy-relevant insights regarding the operation and outcomes of EU Cohesion Policy.

4 | Descriptive Statistics and Preliminary Observations

In this chapter, descriptive statistics for selected economic indicators at regional (NUTS-2) and national levels in Czechia, Bulgaria, and Romania are presented with a view to undertaking a more detailed analysis of the consequences of European Union Cohesion Policy. These descriptive statistics illustrate contrasting patterns of regional heterogeneity and macroeconomic dynamics for productivity, entrepreneurship, innovation capacity, external trade volumes, and EU funding absorption. The statistical comparisons and observations provide structural understanding for the regression analyses in the following chapters and serve to highlight the linkage between institutional capacity and economic performance.

4.1. Structure of the Dataset

This thesis utilises a panel dataset created at both the national level and NUTS-2 regional level for the purposes of understanding the effect of financing through the European Union (EU) Cohesion Policy on economic development. The dataset is spanning the years from 2014 to 2020 and permits a multi-level analysis of three Eastern European countries—Czechia, Bulgaria, and Romania. This structure builds an understanding of both macroeconomic trends, and regional heterogeneity.

4.1.1. Regional (NUTS-2) Level Structure

The regional-level dataset is richer and more detailed, consisting of 203 observations in total. It includes all NUTS-2 regions of Bulgaria and Romania, while Czechia is also adequately represented with a balanced structure. Key regional variables include regional Gross Domestic Product (GDP), employment, gross fixed capital formation (GFCF), human resources in science and technology (HRST), and firm dynamics such as enterprise births, closures, and active enterprises.

Using these variables, the following derived indicators were calculated: labor productivity (GDP per employed person), enterprise growth rate (births of enterprises / active enterprises), enterprise birth-to-death ratio (entrepreneurship indicator), and total factor productivity (TFP).

Additionally, two additional measures of Total Factor Productivity (TFP) were developed at the regional level. The first measure employed a Cobb-Douglas production function based on labour and physical capital (GFCF), and the second measure followed a similar approach using HRST (Human Resources in Science and Technology) instead of capital to represent innovation- and knowledge-based endogenous growth theories of TFP. These two measures offer a useful comparison of tangible and intangible sources of productivity.

4.1.2. National Level Structure

At the national level, the dataset includes 21 observations in total, corresponding to 7 years for each of the 3 countries. The primary national variables are gross domestic product (GDP) and GDP per capita, employment, gross fixed capital formation (GFCF), human resources in science and technology (HRST), trade data (exports and imports), foreign direct investment inflows and outflows, and firm dynamics including enterprise births, deaths, and active enterprises.

The following derived variables were computed at the national level as well: labor productivity (GDP/employment), enterprise growth rate (births of enterprises/active enterprises), enterprise birth-to-death ratio (entrepreneurial dynamism indicator), and total factor productivity (TFP).

Also, the data includes structural control variables such as gross domestic expenditure on R&D (GERD) and household income. These are all collected yearly, which allows for the simultaneous modeling of EU fund movements and economic impacts. Productivity variables including TFP were also generated and provided as well.

4.2. Descriptive Statistics: Regional Economic Structure and Variation

In this section we report on the economic, innovation related, and policy relevant indicators at the NUTS-2 level for Czechia, Bulgaria, and Romania for the 2014-2020 programming period. The intention is to draw attention to regional difference, argue for the

appropriateness of most effects panel regression models, and provide a baseline for our empirical analysis.

The descriptive statistics reveal noteworthy structural heterogeneity across regions. The regional differences are not only apparent for macroeconomic indicators such as GDP and employment, but also for entrepreneurial features (e.g. firm birth/death ratio), productivity, as well as distribution of EU Cohesion Policy funding. These disparities emphasize that region specific models and interpretation of the results must be in light of local circumstances.

Table 4.1: Descriptive Statistics for Regional-Level Variables (2014–2020)

Variable	Mean	Std. Dev.	Min	Max
GDP (million EUR)	19,843.88	12,262.61	3,089.10	61,660.45
Employment (million)	0.7772	0.3208	0.2656	1.6128
GERD (million EUR)	227.32	306.42	10.92	1,562.71
HRST (share)	0.2963	0.1338	0.1042	0.7241
Enterprise Births (million firms)	0.0112	0.0057	0.0026	0.0302
Enterprise Deaths (million firms)	0.0095	0.0044	0.0025	0.0246
Active Enterprises (million firms)	0.1107	0.0541	0.0276	0.2885
EU Funding (million EUR)	210.39	329.75	0.19	1,980.29
Household Income (million EUR)	11,268.21	5,884.03	1,803.16	33,571.03
Gross Fixed Capital (million EUR)	347.02	635.89	17.80	4,190.96
Birth-to-Death Ratio	1.1633	0.1630	0.8341	1.6092
Enterprise Growth Rate	0.1026	0.0160	0.0751	0.1343
Labor Productivity (EUR)	25,764.92	14,407.61	9,884.98	86,750.77
TFP (GFCF-based)	4,777.29	2,238.98	1,615.90	14,503.40
TFP (HRST-based)	33,454.88	15,518.27	14,038.57	95,728.44

This analysis highlights clear structural and economic variations, as detailed in Table 4.1. The average GDP values shown in the table for the 30 regions provide some guidance, as these average values are around 19.8 billion EUR. Although the values for GDP (based on 30 NUTS-2 regions) range from 3.1 billion to 61.7 billion EUR, a more accurate assessment of regional disparities is reflected by the high standard deviation of GDP (12,262.61 million EUR), which indicates substantial variation across regions—especially between capital and non-capital areas.

In terms of employment, regional levels also demonstrate enormous variances from 0.27

million to 1.61 million people, with a mean of 0.78 million. Overall, regional differences denote levels of scale and economic character, which serve as referent comparisons on labour force participation and, to some extent, sectoral patterns of specialisation.

There is a similarly vast divergence in labour productivity, which can be set against the EU-28 average of approximately 33,138 EUR per employed person. The values range between 9,885 EUR and over 86,750 EUR across regions. Such divergence points to strong variations in the adoption of technology, industrial mix, and labour force skills across the regions.

Total Factor Productivity (TFP), derived from a Cobb-Douglas model, also indicates major structural differences. TFP produced from the GFCF-derived model ranges from 1,616 to 14,503 with a mean of 4,777. The HRST-based TFP model had a much larger range, from 14,038.57 to 95,728.44, with a mean of 33,454.88.

EU funding is a key source of public capital in the regional economy and varies considerably, from 190,000 EUR up to 1.98 billion EUR, with a mean of 210 million EUR. (Barca et al., 2012) argue that aligning appropriate governance frameworks with each region's priority strategies can enhance the effectiveness of funding absorption and regional impact.

The picture on entrepreneurship is mixed. The enterprise birth-to-death ratio ranged from 0.83 to 1.61 with a mean of 1.16, highlighting that some regions are experiencing a net decline in firm population. The enterprise growth rate shows mean values around 10.26%, however, growth remains modest across the board.

Innovation and welfare indicators tell a substantial part of the story. GERD values range from 10.9 million EUR to 1.56 billion EUR with a mean of 227 million. Similarly, household income ranges from 1.8 billion EUR to 33.6 billion EUR, with the mean around 11.3 billion EUR. Both of these indicators were used as control variables in the regression models. (Fratesi and Perucca, 2019a) point out the obstacles that regions with lower innovation capacity and consumer power face in converting EU assistance into long-term development.

4.2.1. GDP, Employment, and Labor Productivity Structure

Table 4.2: Selected Regions by GDP, Employment, and Labor Productivity (2014–2020)

Country	Region	Funding	GDP	Employment	Labor Productivity
Czechia	Praha	1301.07 (644.77)	52018.37 (7640.03)	0.6780 (0.03)	76446.76 (8324.03)
	Jihových.	393.08 (227.45)	27870.33 (3800.83)	0.8202 (0.02)	33916.44 (4012.15)
	Severozáp.	122.88 (92.81)	14180.92 (1471.55)	0.5249 (0.01)	26982.35 (2353.74)
Romania	Sud-Munt.	211.66 (242.88)	22374.60 (2518.33)	1.2786 (0.03)	17512.39 (2065.08)
	Nord-Est	161.30 (121.97)	19518.31 (3546.61)	1.5862 (0.02)	12293.14 (2153.26)
	București	115.70 (100.87)	51093.42 (8575.85)	1.1178 (0.04)	45548.60 (6334.90)
Bulgaria	Yugo.&Y.T. BG	94.18 (102.33)	33235.16 (5429.66)	1.6237 (0.05)	20456.99 (3254.80)
	Yugozap.	16.89 (14.48)	25774.22 (4265.77)	1.0176 (0.03)	25289.52 (3891.23)
	Yugoiztoch.	8.68 (11.89)	6313.93 (575.13)	0.4281 (0.02)	14735.20 (1014.63)

Note: All values represent average figures for 2014–2020. Standard deviations are reported in parentheses. Region names are abbreviated; full names are listed in Appendix A.

Table 4.2 presents a comparative overview of selected NUTS-2 regions from Czechia, Romania, and Bulgaria, showing variations in funding levels, economic output (GDP), size of labor force, and productivity. The selected regions reflect a range in terms of EU Cohesion Policy assistance, from heavily funded to little funded to roughly median. The table indicates that more funding does not always correspond with higher productivity; for instance while Praha (Czechia) had a considerable amount of funding and the highest labor productivity level achieved (€76,446 per worker), București (Romania), which received less funding, also has relatively high productivity levels (€45,548). In contrast, Nord-Est (Romania) received moderate funding and has one of the lowest productivity outcomes (€12,293), despite having the largest regional labor force. Such heterogeneity

indicates the complex interrelationship between funds, regional capacity, and structural constraints; this supports the notion that for EU funding to be effective, it is reliant on absorptive capacity as well as complementary institutions (Rodríguez-Pose and Garcilazo, 2015; Bachtler et al., 2016a).

The table provides significant differences in the number of people in the active labor force between these regions. For example, Nord-Est (Romania) and Yugo.&Y.T. BG (Bulgaria) show average employee numbers of more than 1.5 million because of their big populations although they produce moderate economic output. While, Praha (Czechia) has the highest GDP and productivity under this analysis, with a small labor force (0.68 million) which makes sense because of the small urban pattern of settlement. The data suggests that the higher the economic output does not automatically lead to a higher number of employees and that some of the regional development strategies may need to accommodate workforce size as well as productivity improvements.

It is also notable that standard deviations vary considerably across the regions, reflecting different levels of volatility and consistency. For instance, GDP and productivity figures in București and Praha are accompanied by relatively high standard deviations, indicating year-to-year variability likely stemming from urban economic dynamism. Meanwhile, regions like Severozápad and Yugoiztochen show smaller deviations, which may imply more structural stagnation or stable but limited growth. These variations further justify the use of fixed effects models to account for such unobserved heterogeneity.

All these descriptive trends highlight the need for incorporating control variables such as household income and GERD in the econometric models, as they capture regional differences in the capacity to innovate and consume. Moreover, the differences in productivity across regions which have the same level of funding reinforce the use of fixed effects specifications - as has been done in the second regression analysis. In general, the table supports the notion, which we have exemplified in the argument, that while funding is a necessary condition for development, it is not sufficient without enabling structural and institutional conditions.

Table 4.3: Representative NUTS-2 Regions by GDP, Employment, and Labor Productivity (2014–2020)

Country	Region	GDP	Employment	Labor Productivity	Closeness Score
Czechia	Jihovchod	27870.33 (3800.83)	0.8202 (0.0165)	33916.44 (4012.15)	18005.11
	Stř. Čechy	22092.06 (3264.43)	0.6655 (0.0227)	33087.81 (3828.45)	24612.16
	Severových.	22446.56 (3084.83)	0.7259 (0.0135)	30870.67 (3755.42)	26474.75
	Jihozáp.	18915.09 (2378.42)	0.5986 (0.0107)	31549.40 (3484.03)	29327.62
	Stř. Morava	17870.85 (2283.75)	0.5784 (0.0135)	30848.60 (3459.72)	31072.68
Romania	Macro P4	31789.22 (5231.47)	1.5721 (0.0573)	20266.92 (3514.10)	2403.81
	Centru	21164.56 (3531.87)	0.9146 (0.0201)	23122.44 (3731.81)	11077.03
	Nord-Vest	22510.60 (4189.63)	1.1662 (0.0167)	19294.93 (3454.94)	11669.83
	Macro P1	43675.16 (7717.23)	2.0800 (0.0299)	20974.89 (3620.37)	13582.28
	Sud-Munt.	22374.60 (2518.33)	1.2786 (0.0275)	17512.39 (2065.08)	13588.25
Bulgaria	Yugoiztoch.	6313.93 (575.13)	0.4281 (0.0160)	14735.20 (1014.63)	7978.67
	Sev. & Yug. BG	19538.39 (1997.33)	1.4166 (0.0430)	13809.99 (1565.52)	8369.75
	Severoiztoch.	5571.43 (619.89)	0.3930 (0.0175)	14232.64 (2040.10)	9223.78
	Yuzh. Tsent.	7460.94 (1168.02)	0.6060 (0.0196)	12326.16 (2034.32)	9240.53
	Severozap.	3574.44 (467.14)	0.2709 (0.0088)	13244.55 (2093.82)	12208.97

Note: For each country, five NUTS-2 regions with the smallest aggregate deviation from national averages in GDP, employment, and labor productivity are listed. The “closeness score” represents the sum of absolute deviations from each national mean. Region names are abbreviated for formatting clarity; full names are provided in Appendix A. All values represent averages for 2014–2020; standard deviations are reported in parentheses.

Table 4.3 demonstrates the five NUTS-2 regions in each of the three countries (Czechia, Romania and Bulgaria) that are closest to the national averages with respect to GDP, employment and labor productivity. These regions were selected based on their aggregate distance from the national means, using the "closeness score," which is calculated by taking the sum of the absolute deviations from each indicator's national average. Hence, the MVC methods provide a way to select structurally representative regions, with less influence from extremal values so that follow-up econometric analyses can proceed with a more balanced geographical region sample.

For instance, in Czechia, regions Jihovchod and Střední Čechy have productivity and output levels relatively close to the national means, demonstrating representative regions. Likewise, Macroregiunea Patru and Centru in Romania, and Severna and Yugoiztochna Bulgaria in Bulgaria, demonstrate similarly representative regions of balance in performance. Selecting these types of regions is especially useful when determining aggregate evaluations of the success of EU Cohesion Policy that could otherwise be distorted from extreme performance by sectors that are either highly developed or very underdeveloped sectors as well (Becker et al., 2010; Rodríguez-Pose, 2018).

The differences in the representativeness of a region's employment levels, in terms of GDP and productivity, also consistently demonstrate meaningful regional variation. For example, certain regions (Macro P4, Romania and Sev. & Yug. BG (Bulgaria)) have large employment levels (1.57 million and 1.41 million respectively) and are representative of national labor force trends, even when their productivity values are comparatively lower than average. On the other hand, some regions like Severozap. (Bulgaria) have lower employment (0.27 million) and, although productivity is moderate, employment levels contribute to higher aggregate deviation. These illustrations of employment variations, coupled with GDP and productivity, suggest that observing balanced representation in the context of regional development requires consideration of both economic output and the size and structure of the labor force.

Moreover, the reported standard deviations in parentheses reveal meaningful differences in year-to-year consistency across regions. For example, regions like Macro P1 and București in Romania or Praha in Czechia exhibit higher standard deviations in GDP and productivity, indicating greater volatility possibly due to their dynamic economic structures. In contrast, regions such as Severozápad or Severoiztochna Bulgaria show lower variability, implying more stable but potentially less dynamic development trajectories. These distinctions further support the selection of representative regions for robust cross-sectional and longitudinal analysis.

4.2.2. Total Factor Productivity (TFP)

Table 4.4: Selected NUTS-2 Regions by TFP Indicators and Funding Levels (2014–2020)

Country	Region	Funding	TFP_GFCF	TFP_HRST
Czechia	Praha	1301.07 (644.77)	11091.29 (1577.35)	14122.61 (2167.56)
	Severozáp.	122.88 (92.81)	5520.36 (396.06)	11451.33 (877.46)
	Jihových.	393.08 (227.45)	6412.72 (505.78)	10687.70 (907.55)
Romania	Sud-Munt.	211.66 (242.88)	3619.53 (828.56)	9643.42 (2097.57)
	București	115.70 (100.87)	5054.45 (1671.51)	7274.01 (2363.93)
	Nord-Est	161.30 (121.97)	2780.24 (185.05)	9001.32 (601.12)
Bulgaria	Yugo.&Y.T. BG	94.18 (102.33)	3057.30 (214.51)	4837.18 (383.80)
	Yugoiztoch.	8.68 (11.89)	2476.72 (108.11)	4823.15 (225.05)
	Yugozap.	16.89 (14.48)	3521.31 (202.28)	5030.88 (356.18)

Note: One region from each country was selected to represent the top, bottom, and median-like levels of EU funding. Region names are abbreviated for formatting clarity; full names are provided in Appendix A. All values represent averages for 2014–2020; standard deviations are reported in parentheses.

Table 4.4 compares three NUTS-2 regions (Czechia, Romania, and Bulgaria) selected to be top, bottom and median like amounts of EU funding. We compare the regions based on Total Factor Productivity (TFP) between two measured values, a physical capital based indicator (TFP_GFCF) and a human capital based indicator (TFP_HRST). By including both measures, we can deepen our understanding of how productivity responds to funding in structurally different regions.

In Czechia, the higher funded region, Praha has the highest levels of TFP in both measures, suggesting the idea that strong institutional and absorptive capacity are central to the effects of Cohesion Policy funding. Romania shows a different, and more complex

pattern. Although Sud Muntenia received a larger amount of funding than any other region, it showed a low physical TFP and only a moderate level of human capital TFP. Sud Muntenia region relies heavily on funding for absorptive capacity, and may not be able to utilize the funding effectively due to more serious structural conditions. In Bulgaria, we found a similar trend, where the highest funded region does worse than a less funded region (Yugozapaden) for both measures of productivity.

Standard deviation values provided for both TFP measures further contextualize the consistency of regional productivity levels. For example, Romania's București region shows high variability in both capital-based (SD = 1671.51) and HRST-based (SD = 2363.93) TFP, reflecting potential volatility in institutional effectiveness or labor dynamics. In contrast, the Czech region Severozápad exhibits relatively stable productivity values, as indicated by much smaller standard deviations. These insights reinforce the need to assess not only mean performance but also the reliability and stability of productivity outcomes when evaluating the impact of EU funds.

The patterns highlighted above strengthen the case that the effectiveness of EU funding comes not only from the value of support gained by a region but also from their capacity to absorb and utilize these investments, determined by infrastructure, institutional capacity, and workforce quality (Rodríguez-Pose and Garcilazo, 2015). The two-method TFP analysis also increased the robustness of the findings, capturing productivity differentials from both capital based and human-capital based.

Table 4.5: Representative NUTS-2 Regions by TFP (HRST and GFCF Methods) and Closeness Score (2014–2020)

Country	Region	TFP HRST	TFP GFCF	Closeness Score
Czechia	Jihových.	42207.32 (4973.03)	6412.72 (505.78)	732.82
	Stř. Čechy	42181.09 (4721.09)	6933.34 (586.14)	771.80
	Jihozáp.	41516.07 (4623.60)	6376.87 (808.18)	1459.92
	Stř. Morava	40432.91 (4518.91)	6436.89 (462.76)	2483.05
	Česko	47093.61 (5092.48)	7173.45 (607.90)	4914.21
Romania	Sud-Est	29791.74 (3287.70)	3976.72 (951.37)	214.83
	Macro P1	29498.04 (4899.89)	3906.42 (355.17)	248.31
	Macro P4	29393.35 (5118.75)	4495.47 (722.10)	702.30
	Centru	31794.93 (5160.15)	4271.79 (656.42)	2413.95
	Nord-Vest	27654.33 (4718.65)	3481.06 (684.72)	2517.38
Bulgaria	Sev. & Yug. BG	17970.29 (2179.42)	2473.88 (249.97)	280.86
	Severoiztoch.	18401.81 (2967.55)	2317.01 (235.51)	869.25
	Severozap.	17133.85 (2830.15)	3159.74 (398.12)	1241.44
	Severen Tsentr.	16153.08 (2814.11)	2756.78 (566.49)	1819.25
	Yugoiztoch.	15954.19 (1466.38)	2468.06 (101.31)	1910.58

Note: For each country, five NUTS-2 regions closest to the national average in TFP (both HRST-based and GFCF-based) are listed. The “closeness score” is calculated as the sum of absolute deviations from national means. Region names are abbreviated for formatting clarity; full names are provided in Appendix A. All values represent averages for 2014–2020; standard deviations are reported in parentheses.

Table 4.5 presents five NUTS-2 regions from each country that most closely match the national average in terms of Total Factor Productivity (TFP), based on both capital-based (TFP_GFCF) and human capital-based (TFP_HRST) measures. The selected regions are those with the smallest aggregate deviation from their national means, defined as the "closeness score."

In Czechia, the selected regions tightly cluster around the national average with a relatively low closeness score for both dimensions and high levels of productivity on either dimension. Romania's selected representatives show greater variation in both GFCF- and HRST-based TFP, indicating greater heterogeneity in its regional landscape than the other two countries. Bulgaria, in contrast, had consistently lower measures of TFP across each dimension during this study, with average productivity values that were well below those of Czechia and Romania; this is expected due to economic differences on the whole among the three countries.

Standard deviations across regions also reveal inherent volatility in regional productivity. While countries with lower average HRST-based TFP performance tend to have relatively modest standard deviations, the HRST-based TFP measures for Romania demonstrate greater dispersion across areas, for instance macro-area P4 and Centru reports standard deviations higher than 5100 suggesting quickly changing performance either over time or according to subregional differences. In Bulgaria, the HRST standard deviation from Severoiztochen (2967.55) was noticeably higher than in Yugoiztoch (1466.38), highlighting more unstable knowledge-based productivity in some regions. All of these differences should be taken into account when assessing the extent to which regions aggregate performance consistently relative to a national average.

Mean values for each country were added for reference purposes to illustrate the dispersion within each of the countries. This structure also serves the purpose of providing context for our focus on productivity convergence (or lack thereof) at the regional level. Lastly, our comparative structure supports subsequent empirical models aimed at explaining this divergent productivity development based on the interactions of EU funding and structural capacity (Becker et al., 2010; Rodríguez-Pose, 2018).

4.2.3. Enterprise Dynamics

Table 4.6: Selected NUTS-2 Regions by Funding and Entrepreneurship Indicators (2014–2020)

Country	Region	Funding	Growth Rate	Birth/Death Ratio	Enterprise Births
Czechia	Praha	1301.07 (644.77)	0.0985 (0.0059)	1.285 (0.133)	0.0269 (0.0019)
	Severozáp.	122.88 (92.81)	0.0872 (0.0043)	1.000 (0.087)	0.0079 (0.0004)
	Jihových.	393.08 (227.45)	0.0839 (0.0034)	1.143 (0.087)	0.0150 (0.0006)
Romania	Nord-Est	161.30 (121.97)	0.1074 (0.0110)	1.292 (0.164)	0.0111 (0.0015)
	Sud-Muntenia	211.66 (242.88)	0.1104 (0.0121)	1.278 (0.125)	0.0106 (0.0015)
	București	115.70 (100.87)	0.1262 (0.0067)	1.291 (0.094)	0.0208 (0.0006)
Bulgaria	Yugozapaden	16.89 (14.48)	0.1193 (0.0139)	1.126 (0.137)	0.0197 (0.0023)
	Yuzhen tsentralen	61.23 (51.53)	0.1040 (0.0100)	1.112 (0.132)	0.0073 (0.0007)
	Yugoiztochen	8.68 (11.89)	0.1123 (0.0119)	1.010 (0.121)	0.0063 (0.0008)

Note: One region per country was selected to represent top, bottom, and median-like levels of EU funding. Entrepreneurship is measured by enterprise growth rate, birth-to-death ratio, and per capita enterprise births. Region names are abbreviated; full names are listed in Appendix A. All values represent averages for 2014–2020; standard deviations are reported in parentheses.

Table 4.6 displays a number of selected (NUTS-2) regions from Czechia, Romania, and Bulgaria, where high, median or low amounts of EU funding have been provided. Each of the selected regions has been analysed with three salient entrepreneurship indicators, which includes enterprise growth rate, birth/death ratio and rate of per capita enterprise births in the year, providing comparative data across the three cases.

In the case of Czechia, Praha, which is also the most funded region, scored the best on all indicators of entrepreneurship, registering the highest enterprise growth rate at 0.0985, birth death ratio of 1.285, and birth rate of 0.0269. Jihovýchod, the medium funded region, has comparably moderate indicators, yet relatively consistent measures. Severozápad, the least funded region, reportedly has the least defensible performance; its growth rate was 0.0872 and birth rate of 0.0079 as compared to the other regions reported.

In Romania, București, that has the highest indicators of entrepreneurship, which was

not the high funded region reported in this table. It had the highest growth rate of 0.1262, birth/death ratio of 1.291, and birth rate of 0.0208. Sud-Muntenia, which was the most highly funded region, had slightly inferior results in each category of the entrepreneurship indicator as compared to București, signalling that factors of urban agglomeration and economic centrality leads to a conclusion in comparative funding.

Yugozapaden—the region enjoying the highest funding in Bulgaria—demonstrates strong performance in both growth rate (0.1193) and enterprise birth rate (0.0197). Yugoiztochen, the region with the lowest funding, unsurprisingly scores lowest in all three indicators and the Yuzhen Tsentralen region is moderate in terms of funding, and thus has an intermediate position in terms of performance.

These patterns suggest that while EU funding can stimulate entrepreneurship, it is not enough alone, and the regional context—i.e., human capital, market size, and institutional quality—considerably affect the dynamics of entrepreneurship (Rodríguez-Pose, 2013a). Moreover, the relatively low standard deviations in enterprise birth and growth rates in most regions indicate that these entrepreneurship indicators remained quite stable over the 2014–2020 period. This reinforces the idea that structural and institutional foundations, rather than short-term fluctuations, play a dominant role in shaping entrepreneurial activity. Thus, in addition to transfers, the cohesion policy should also emphasize targeted investments in the institutional and structural pillars necessary to build and sustain an entrepreneurial ecosystem.

Table 4.7: Representative NUTS-2 Regions by Entrepreneurship Indicators (2014–2020)

Country	Region	Growth Rate	Birth/Death Ratio	Enterprise Births	Closeness Score
Czechia	Střední Čechy	0.0858 (0.0035)	1.1237 (0.1036)	0.0124 (0.0007)	0.0187
	Jihovýchod	0.0848 (0.0027)	1.1428 (0.0869)	0.0151 (0.0007)	0.0193
	Severovýchod	0.0809 (0.0033)	1.0759 (0.1004)	0.0121 (0.0005)	0.0195
	Jihozápad	0.0802 (0.0034)	1.0382 (0.0904)	0.0096 (0.0004)	0.0216
	Česko	0.0879 (0.0040)	1.1350 (0.1055)	0.1028 (0.0057)	0.0248
Romania	Sud-Est	0.1096 (0.0087)	1.1862 (0.0792)	0.0095 (0.0009)	0.0111
	Vest	0.1151 (0.0066)	1.3173 (0.0994)	0.0086 (0.0009)	0.0160
	Sud-Muntenia	0.1106 (0.0132)	1.2778 (0.1248)	0.0105 (0.0016)	0.0224
	Sud-Vest Oltenia	0.1095 (0.0110)	1.1956 (0.0724)	0.0067 (0.0008)	0.0822
	Centru	0.1075 (0.0117)	1.3631 (0.1193)	0.0112 (0.0017)	0.0297
Bulgaria	Yugoiztochen	0.1170 (0.0028)	1.0387 (0.1284)	0.0066 (0.0002)	0.0092
	Yuzhen Tsentralen	0.1071 (0.0033)	1.1179 (0.1188)	0.0075 (0.0004)	0.0127
	Severen Tsentralen	0.1049 (0.0040)	1.0393 (0.1053)	0.0037 (0.0002)	0.0156
	Severozapaden	0.0967 (0.0026)	0.9960 (0.0901)	0.0027 (0.0001)	0.0346
	Severoiztochen	0.1212 (0.0037)	1.0270 (0.1112)	0.0063 (0.0002)	0.0420

Note: Five NUTS-2 regions per country with the lowest aggregate deviation from national averages in enterprise growth rate, birth-to-death ratio, and enterprise births are shown. Region names are written in full for clarity. All values represent averages for 2014–2020; standard deviations are reported in parentheses.

Table 4.7 reports five representative NUTS-2 regions from each Czechia, Romania and Bulgaria that have been identified based on their proximity to national means for three entrepreneurship indicators: enterprise growth rate, birth-to-death ratio and enterprise births. In identifying the regions, total deviation from national means were calculated to derive a collective – or "closeness" score. The objective was to find a few regions that

best represent the structural average of each national entrepreneurial environment.

The regions in Czechia selected are much closer to the national average with enterprise growth rates between 0.0802 and 0.0879 and relatively balanced birth/death ratios which suggests a more structurally coherent environment for entrepreneurship. The representative regions in Romania are more dispersed, especially in terms of birth/death ratios. Enterprise birth rates remain relatively close to each other, but combined with other indicators, they still reflect noticeable heterogeneity in the entrepreneurial landscape. The selected regions in Bulgaria have lower overall levels of enterprise births than Czechia and Romania, they also demonstrate more wide variation in growth and ratio indicators, which is consistent with the relatively weaker entrepreneurial ecosystem.

The analysis of the "average-like" regions minimized the issue of an emphasis on outliers and allowed for a more generalized finding to be used in later empirical models. Further, these results also emphasized the significance of balanced structural features in facilitating entrepreneurship, lending support to arguments made in earlier studies regarding the importance of both economic and institutional readiness in business development at the regional scale (Rodríguez-Pose, 2013a). Moreover, the relatively low standard deviations observed for growth and birth indicators in Czechia and Bulgaria—compared to more dispersed values in Romania—suggest a more stable and consistent entrepreneurial environment in these two countries. This reinforces the interpretation that structural coherence, rather than sporadic peaks, plays a larger role in regional entrepreneurship patterns.

4.3. Descriptive Statistics: National Economic Structure and Variation

This section present a summary descriptive statistical overview for Czechia, Bulgaria, and Romania at the national level for the 2014–2020 period. The macroeconomic indicators analyzed below will enhance our previous NUTS-2 regional analysis by offering an understanding of structural trends and macroeconomic interactions with EU Cohesion Policy at a country level.

Table 4.8: Descriptive Statistics for Czechia (2014–2020)

Variable	Mean	Std. Dev.	Min	Max
GDP (million EUR)	195518.00	26817.03	158991.50	229406.70
GDP per Capita (EUR)	18588.08	2529.66	15142.05	21744.71
Employment (million)	5.0446	0.1043	4.8830	5.1510
EU Funding (million EUR)	4927.17	4467.76	406.38	12016.83
Enterprise Births (million)	0.0924	0.0048	0.0856	0.1003
Enterprise Deaths (million)	0.0803	0.0047	0.0749	0.0885
Active Enterprises (million)	1.0487	0.0241	1.0220	1.0837
Import (million EUR)	140087.90	17107.92	114919.10	159553.00
Export (million EUR)	156761.20	17640.52	130709.60	177528.00
Inward FDI Stocks (million EUR)	65.71	3.70	60.30	72.20
Outward FDI Stocks (million EUR)	13.76	4.07	9.10	19.00
GERD (million EUR)	3625.46	578.22	2963.27	4348.35
Household Income (million EUR)	113745.50	18035.28	91584.80	134936.50
TFP (Capital-based)	0.9843	0.0305	0.9300	1.0200
TFP (HRST-based)	403547.50	45625.13	342137.80	463475.00

Czechia’s descriptive statistics and present in Table 4.8 display a rather high and stable macroeconomic profile when considered in the context of Central and Eastern Europe (CEE). The average GDP of €195.5 billion between 2014 and 2020 and moderate spread (SD = €26.8 billion) speaks to the advanced industrial structure and macroeconomic stability of Czechia (World Bank, 2022). GDP per capita is above that of Bulgaria and Romania, with an average of €18,588, reflects the supremacy of Czechia’s market economy relative to its CEE counterparts (Piatkowski and Grosse, 2020).

Employment is similarly stable, averaging 5.04 million jobs, with a low standard deviation (0.10 million jobs) suggesting Czechia’s regulated labour market and demographic structure. These numbers reflected Czechia’s relatively strong rates of labour force participation and population figures.

The EU Cohesion Policy funding levels were between €4.93 billion each year on average and had a substantial standard deviation (€4.47 billion). The minimum number each year was above €400 million, suggesting Czechia’s strong absorption capacity and institutional effectiveness. This consistency suggests Czechia had a mature capacity for alignment with EU funding cycles and the accompanying compliance mechanisms (Charron et al., 2014;

Crescenzi and Giua, 2020).

Enterprise dynamics in Czechia further endorse the structural stability picture. On average, there is around 1,050,000 active enterprises, which exhibit low levels of variability. Births of enterprises (mean = 0.092 million) and deaths (mean = 0.080 million) are very close together, indicating a mature entrepreneurial ecosystem with balanced turnover. This finding is consistent with the literature which associated Czechia with a resilient business environment with a moderate risk of enterprise failure (Audretsch and Fritsch, 2002a).

Trade indicators position Czechia as a strongly integrated export driven economy. The amount exported per annum on average (€156.7 billion) slightly exceeds imports (€140.1 billion), indicating an surplus oriented industrial base which performs strongly within external demand (European Commission, 2018).

The average inward FDI stocks are €65.7 billion, and average outward FDI stocks of €13.76 billion- both the highest among the three sample countries. Overall this indicates an internationally oriented private sector and high levels of cross border capital flows (Radosevic and Yoruk, 2013).

Innovation metrics strongly corroborate Czechia's exceptional rankings. With average GERD at €3.63 billion, funding for R&D is significant; total factor productivity (TFP), based on HRST, averages 403547. This figure is substantially higher than the average for the CEE region. These figures demonstrate congruence with EU Smart Specialisation approaches (RIS3) and the successful targeting of ERDF investments into knowledge-intensive areas (Crescenzi and Giua, 2020; Zaharia et al., 2021a).

In summary, Czechia's national-level data indicate strong economic fundamentals, good governance and innovation capability/conduct, and a clear institutional advantage in generating real economic activity from cohesion funds.

Table 4.9: Descriptive Statistics for Bulgaria (2014–2020)

Variable	Mean	Std. Dev.	Min	Max
GDP (million EUR)	52775.49	7388.98	43024.70	61912.50
GDP per Capita (EUR)	7788.87	1303.08	6085.53	9452.29
Employment (million)	2.9299	0.0812	2.8000	3.0320
EU Funding (million EUR)	1421.27	1346.59	7.75	3625.74
Enterprise Births (million)	0.0394	0.0040	0.0310	0.0434
Enterprise Deaths (million)	0.0402	0.0058	0.0340	0.0501
Active Enterprises (million)	0.3446	0.0068	0.3328	0.3524
Import (million EUR)	29325.93	3163.49	26055.03	33610.95
Export (million EUR)	26233.77	3062.59	22039.91	29774.46
Inward FDI Stocks (million EUR)	81.20	4.93	75.10	87.20
Outward FDI Stocks (million EUR)	4.07	0.38	3.60	4.70
GERD (million EUR)	428.37	68.75	339.93	523.46
Household Income (million EUR)	30628.53	4374.97	25251.88	35713.49
TFP (Capital-based)	0.9943	0.0181	0.9700	1.0200
TFP (HRST-based)	190138.40	28063.87	157738.40	230776.00

Table 4.9 contains descriptive statistics for Bulgaria for the period 2014 - 2020, displays a much less ambitious macroeconomic and institutional profile than Czechia. The mean GDP is €52.8 billion, with a standard deviation of €7.4 billion. However, GDP per capita is much lower, with a mean of €7,789, indicating that Bulgaria continues to be one of the poorer Member States of the EU (Piatkowski and Grosse, 2020).

Employment is just under 3 million, and the low standard deviation suggests few year-to-year variations in employment levels reflective of relative labor market stability but also operating within demographical constraints related to an aging population and declining supply of labor (World Bank, 2022).

The amount of EU funds received annual averages €1.42 billion but has high variation (SD = €1.35 billion). The minimum value of only €7.75 million indicates that there is excessive year-to-year variation in the amount of funds received based likely on uneven disbursement processes caused by delayed absorption and institutional constraints. (Rodríguez-Pose and Fratesi, 2004; Zaharia et al., 2021a) have identified Bulgaria as a case where weak administrative capacity and poorly developed pipeline of projects often delays the absorption EU cohesion funds.

The birth and death rates of enterprises are nearly equal, both at 0.04 million which reveals a very fragile entrepreneurial ecosystem that has rapid turnover, coupled with an unspectacular net increase (mean of 0.34 million during this period) of active enterprises—suggesting likely to have the same dynamics as lower-innovation regions where the barriers to entry are low, which will inevitably lead to high exit rates; that is how you get turnover and limited growth (Audretsch and Fritsch, 2002a).

Similarly, trade integration in the region is significantly less than observed in Czechia with average exports of €26.2 billion and imports of €29.3 billion. Given the gap between exports and imports, a reliance on imported products and limited project competitiveness in high-value exports is inferred; consistent with Bulgaria’s standing in the lower segment of EU value chains (European Commission, 2018).

Patterns reflected in Foreign Direct Investment (FDI) also support this line of reasoning. Total outward FDIs are relatively low (mean = €4.07 billion) illustrating a lack of outward investment footprint internationally, and that domestic firm global reach is small - unless it is supported through inward investments (Radosevic and Yoruk, 2013).

Innovation and productivity figures suggest systemic difficulties. GERD levels are low (mean = €428 million) and the HRST-based TFP index average indicates much lower (€190K) less than half of the value of Czechia. These suggest that relative importance of small-scale research and knowledge-based growth as well as delayed adoption (Crescenzi and Giua, 2020).

In conclusion, the Bulgarian case demonstrates the limitations of cohesion policy in low-capacity contexts. Even with a relatively high level of funding, insufficient administrative and innovation infrastructure might limit the ability to convert financial inputs into economic performance. This reinforces the claim that another important mediating determinant of regional development outcomes is institutional quality (Rodríguez-Pose and Fratesi, 2004; Crescenzi and Giua, 2020).

Table 4.10: Descriptive Statistics for Romania (2014–2020)

Variable	Mean	Std. Dev.	Min	Max
GDP (million EUR)	188108.30	29921.99	150528.80	224767.40
GDP per Capita (EUR)	9612.70	1636.17	7556.67	11591.92
Employment (million)	7.5037	0.1642	7.2600	7.6910
EU Funding (million EUR)	4196.73	3516.42	637.78	9878.78
Enterprise Births (million)	0.0797	0.0056	0.0709	0.0870
Enterprise Deaths (million)	0.0642	0.0060	0.0595	0.0765
Active Enterprises (million)	0.7323	0.0328	0.6951	0.7872
Import (million EUR)	73390.26	10725.82	58416.80	86013.44
Export (million EUR)	60815.74	6375.21	52408.42	68795.89
Inward FDI Stocks (million EUR)	40.60	1.08	39.30	42.30
Outward FDI Stocks (million EUR)	0.59	0.34	0.20	1.10
GERD (million EUR)	891.27	176.58	575.12	1067.44
Household Income (million EUR)	104810.80	21359.23	77732.81	132544.90
TFP (Capital-based)	0.9843	0.0513	0.9100	1.0400
TFP (HRST-based)	284108.70	38373.59	238894.00	331015.70

Table 4.10 shows the national-level descriptive statistics for Romania over the period of 2014–2020. Romania’s overall economic profile lies between Czechia and Bulgaria in most considerations, although there appears to be significant internal heterogeneity so that the regional asymmetries may be more persistent. Romania’s mean GDP is €188.1 billion, second only to CZ in the sample but with a fairly large standard deviation of €29.9 billion. GDP per capita is relatively low, at €9,613—though above BG—because it is still well lower than the EU average (Piatkowski and Grosse, 2020).

Romania similarly has the largest labor pool of the three countries at a mean employment of 7.5 million. This refers back to Romania being the most populous, but also it suggests that matching productive quality of employment across its diverse regions imposes hurdles (World Bank, 2022).

It appears that mean annual EU Cohesion Policy averages around €4.2 billion and as stated is very large and nearly identical to that of CZ. However, the standard deviation of €3.5 billion, and the comparatively low minimum where EU Cohesion Policy fell to a low of €638 million imply differing absorptions of EU funding at least in time. These data disparities seem consistent with Romania’s historical difficulties in planning for public

sectors and the low project delivery capacity, especially for prospects in the least developed regions (Zaharia et al., 2021a; Rodríguez-Pose and Fratesi, 2004).

Enterprise dynamics indicate a slow but vulnerable private sector. The average number of active enterprises stands at around 0.73 million—more than Bulgaria but less than Czechia. It is to the credit of the enterprise statistics that the birth and death rates of enterprises numerically do not substantially vary (0.080 million vs 0.064 million)—with modest net growth accompanied by minimal transformation driven by entrepreneurship (Audretsch and Fritsch, 2002a). The standard deviations are larger than in Czechia—indicating greater year-on-year variation, yet highlighting a more uncertain business landscape.

Romania's indicators for external trade are significantly lower than those of Czechia, with exports averaging €60.8 billion and imports €73.4 billion. The trade deficit is consistent with the literature identifying Romania as a semi-integrated EU economy in value chains (European Commission, 2018).

Romania's supply chains remain heavily reliant on intermediate imports and restrained capability for high-value added exports. The position of Romania within FDI is weak in terms of global positioning. Inward FDI stocks are on average halfway between Czechia and Bulgaria at €40.6 billion, and outward FDI is negligible (€0.59 billion)—demonstrating the weak internationalisation of Romanian firms (Radosevic and Yoruk, 2013).

GERD and HRST-based productivity metrics additionally expose structural impediments. R&D expenditures averaged €891 million, far below Czechia, while HRST-based total factor productivity reveal that the indicator is at €284,109. The data supports previous findings (Crescenzi and Giua, 2020; Zaharia et al., 2021a). that indicate Romania's insufficient science infrastructure and failure to absorb available EU research funding.

In sum, Romania is a mixed case; while macroeconomic totals and scale of labor represents potential, institutional and innovation-related factors hamper full use of cohesion policy. Thus, although EU funding levels are reasonable high, not all instances reflect sound absorption or quality performance so administrative capacity and governance reform is essential to reversing investment outputs into sustainable growth outcomes.

5 | Empirical Analysis and Results

This chapter discusses the empirical evaluation related to the economic effects of EU Cohesion Policy funding at both regional (NUTS-2) and national levels for Czechia, Bulgaria, and Romania from the 2014–2020 programming periods. The analysis relied on fixed effects the panel regression models to estimate the relationship between EU funding and economic outcomes such as GDP, employment, labor productivity, total-factor productivity (TFP), international trade, foreign direct investment (FDI), and enterprise activity. Both levels of analysis are reported, but the focal point is primarily on the regional-level outcomes, where a richer dataset, lagged model specification, and spatially disaggregated form produce more precise identification of the effects of funding. National-level models provide a secondary source of information, as they present a macroeconomic picture that may be of interest but suffer limitations in sample size and aggregation. The estimates from both levels illustrate how EU transfers can be translated into tangible development outcomes in specific structural and institutional contexts.

5.1. Regional-Level Analysis

This section presents the results of the empirical analysis conducted at the NUTS-2 regional level for three major beneficiaries of the European Union’s Cohesion Policy: Bulgaria, Czechia, and Romania. The analytical scope focuses on the 2014–2020 programming period, during which EU structural and investment funds were strategically allocated to reduce regional disparities, promote economic convergence, and enhance competitiveness in less-developed areas of the Union.

The primary objective of this regional-level analysis is to assess the economic effects of EU Cohesion Policy funding on a set of selected indicators, including macroeconomic performance and firm-level dynamics. The analysis tests whether EU funding, lagged by one year ($Funding_{t-1}$), significantly affects outcomes such as gross domestic product (GDP), labor productivity, total factor productivity (TFP), and enterprise dynamics (i.e., firm births and growth rates).

To estimate this relationship, we adopt a fixed effects panel data model incorporating both region and year fixed effects. This strategy allows us to control for unobserved time-invariant regional heterogeneity (such as geography, demographics, or historical institutions) as well as temporal shocks common to all regions (e.g., macroeconomic crises or EU-wide policy changes). These controls improve the robustness of the estimated effect of EU funding on regional outcomes.

The independent variable of interest in all models is the lagged one-year absolute value of EU Cohesion Policy funding per region. This lag structure serves an important purpose given the normal time required to implement EU Funded projects. Generally, it takes time for projects to be implemented and generate effects that can be measured. The use of lagged funding also aligns with empirical findings suggesting delayed policy impacts (Becker et al., 2010; Fratesi and Wislade, 2017).

The general estimation strategy is formalized in the following equations. Equation (1) represents the baseline model with only lagged EU funding as the explanatory variable. Equation (2) extends this specification by including control variables to account for regional absorptive capacity and local economic context.

$$Y_{irt} = \alpha + \beta_1 \cdot \text{Funding}_{ir(t-1)} + \mu_r + \lambda_t + \varepsilon_{irt} \quad (1)$$

$$Y_{irt} = \alpha + \beta_1 \cdot \text{Funding}_{ir(t-1)} + \beta_2 \cdot \mathbf{X}_{ir(t-1)} + \mu_r + \lambda_t + \varepsilon_{irt} \quad (2)$$

5.1.1. Gross Domestic Product (GDP)

Gross Domestic Product (GDP) is used in the analysis as the benchmark of regional economic performance. GDP is an aggregate measure of the total value of goods and services produced within a region, thus both representing the amount of output and serving as a clear indicator of the effectiveness of public policy, particularly the initiatives undertaken through EU Cohesion Policy (Becker et al., 2010; Commission, 2020).

In this research, GDP is the dependent variable in a panel data regression model where EU Cohesion Policy funding per region, lagged by one year (Funding_{t-1}). This approach eliminates any contemporaneous association between public investment and economic output, helping to isolate the investment response that differentiates regional economic performance. The use of a one-year lag is consistent with a growing body of research that highlights the delayed economic effects of public investment due to implementation,

absorption, and maturation timelines (Pellegrini et al., 2013; Fratesi and Wishlade, 2017).

Empirical results reveal several key findings, as shown in Table 5.1. In the baseline model without control variables, as defined in Equation (1), the coefficient of $Funding_{t-1}$ is positive but only marginally significant ($\beta = 1.4204$, $p = 0.0814$), with an R^2 value of 0.984, indicating that EU funding explains a substantial share of the variance in regional GDP. When the control variables—*Gross Expenditure on R&D (GERD)* and *household income*, both lagged by one year—are included, the funding coefficient remains highly significant ($\beta = 1.1992$, $p = 0.0021$), consistent with the extended specification presented in Equation (2). Although this coefficient may appear large, it is directly interpretable since both GDP and funding are measured in million euros.

These findings show the important effect of EU Cohesion Policy funding on regional economic output. The results indicate that added funding during the programming period leads to higher regional GDP, likely as a result of improved infrastructure, enhanced public service delivery, and increased support for small and medium-sized enterprises (Bouayad-Agha et al., 2013; Rodríguez-Pose and Fratesi, 2004).

Moreover, the improved explanatory power of the model upon the inclusion of control variables indicates that the funding effect is amplified when regions possess stronger underlying absorptive capacity. Specifically, higher R&D intensity (GERD) facilitates the integration of innovation into productive activities (although not statistically significant in this case: $\beta = 1.0755$, $p = 0.5451$), while greater household income levels stimulate demand-side complementarities that reinforce the growth effect of public investment ($\beta = 1.5151$, $p = 0.0000$) (Rodríguez-Pose, 2018). Here too, the coefficient size should be considered in relation to the measurement unit of household income in million euros.

Overall, the results provide robust evidence that EU funding not only increases the scale of regional output but also interacts positively with local economic fundamentals to produce more sustained and inclusive growth outcomes.

5.1.2. Employment

This section discussed the lagged effects of funding through EU Cohesion Policy on regional employment across Bulgaria, Czechia, and Romania using fixed-effects panel regressions at the NUTS-2 level. The results indicate that EU funding from the previous year ($t-1$) has a statistically significant, positive, and lagged relationship with employment in the included regions, both in the baseline and the extended models, as shown in Table 5.1. In the base model (Equation (1)), the coefficient of lagged funding is $\beta = 0.0000161$, with $p = 0.008$. This result is robust and consistent, exhibiting a strong track record of positive

influence from structural funds on regional labor market growth.

The model's coefficients for lagged funding remained statistically significant when we included our control variables for lagged Gross Expenditure on R&D (GERD) and lagged household income ($\beta = 0.0000134$, $p = 0.0114$), as reported in Table 5.1 and based on the extended specification in Equation (2). The small magnitude reflects the scale of the employment variable, which is measured in millions of persons. Accordingly, a one-million-euro increase in EU funding is associated with an estimated 13.4 additional employed persons, making the coefficient economically meaningful despite its small appearance. The lagged funding relationship diminished slightly in magnitude but remained statistically significant. Our control variables were also statistically significantly associated with employment: GERD ($\beta = 0.0000666$, $p = 0.0078$) and household income ($\beta = 0.0000349$, $p = 0.0333$). These results uphold our expectation that socio-economic indicators and the capability for regional innovation make a complementary contribution, reinforcing the labor market effects of public investment.

In addition, our models show a credible level of fit, with $R^2 = 0.9985$ for our base model and $R^2 = 0.9989$ for our extended model, suggesting that nearly all the variance in regional employment can be explained by our models. Both fixed effects for region and year, that accounted for unobserved heterogeneity and region-specific shocks in any given year, were included as part of both models.

In conclusion, there is strong empirical support in the results that EU Cohesion Policy funding positively and significantly influences regional employment growth. Additionally, modelling innovation capacity and income levels as control variables provides further evidence of the potential importance of structural absorptive capacity regarding the employment benefits of cohesion funding.

5.1.3. Labor Productivity

Labor productivity, expressed as GDP per employed person, is an important indicator of how efficiently labor resources are used within a region. It summarizes the capacity of a regional economy to create value from labour in the form of human capital, which relates to structural innovation, technological change, and competitiveness (OECD, 2020). We use the standard definition for labor productivity: the total GDP divided by total employment, which is in line with the European Commission's approach to assessing regional performance as potential indicators for efficiency (European Commission, 2022c).

This regression analysis uses labor productivity as the dependent variable to determine if funding provided to regions via the EU Cohesion Policy helped yield any efficiency im-

provements in the regional production system, following the specification of Equation (1) and its extended version in Equation (2).

According to the empirical results presented in Table 5.1, in the base model without control variables (Equation (1)), the coefficient of $Funding_{t-1}$ is $\beta = 2.1337$ and is statistically significant at the 1% level ($p = 0.0009$). In the model that includes lagged GERD and household income as controls (Equation (2)), the coefficient decreases slightly to $\beta = 1.8344$ but remains highly significant ($p = 0.00002$), with a strong model fit ($R^2 = 0.9976$). Since labor productivity is expressed as GDP per employed person, measured in euros, the coefficient reflects the average euro increase in productivity per person attributable to one million euros of EU funding.

Overall, these results suggest that EU funding has a positive and large effect on labor productivity at the regional level. The effect may arise from improved skills of the labor force, enhanced digital infrastructure, support for industrial upgrading, and specific human capital interventions that all align with the EU's long-term cohesion and innovation agenda (Percoco, 2017; Crescenzi and Rodríguez-Pose, 2011; Dijkstra et al., 2015)).

Table 5.1: Effect of EU Funding $_{t-1}$ on GDP, Employment, and Labor Productivity

Variable	GDP		Employment		Labor Productivity	
	Baseline Model	Extended Model	Baseline Model	Extended Model	Baseline Model	Extended Model
EU Funding	1.4204*	1.1992***	0.0000161***	0.0000134**	2.1337***	1.8344***
	(0.0814)	(0.0021)	(0.0088)	(0.0114)	(0.0009)	(0.0000)
GERD	–	1.0755	–	0.0000666***	–	6.0286***
		(0.5451)		(0.0078)		(0.0022)
Household Income	–	1.5151**	–	0.00000349**	–	0.7437***
		(0.0000)		(0.0333)		(0.0000)
Observations	96	96	96	96	96	96
R-squared	0.9840	0.9970	0.9985	0.9989	0.9940	0.9976

Note: p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The baseline models include region and year fixed effects only. The extended models additionally control for lagged Gross Expenditure on R&D (GERD) and lagged household income. All monetary variables are expressed in million EUR.

At this point in the thesis, it is clear from Table 5.1 that the effect of lagged EU funding ($Funding_{t-1}$) is positive and statistically significant on regional GDP, employment, and labor productivity. These effects remain highly robust across both the baseline model (Equation (1)) and the extended model with controls (Equation (2)). Notably, the employment and labor productivity outcomes display particularly strong significance levels and stable coefficients, reinforcing the reliability of the findings.

5.1.4. Total Factor Productivity (TFP)

Total Factor Productivity (TFP) reflects the share of economic output that cannot be explained by the accumulation of labor and capital inputs. It captures improvements in technological efficiency, new developments, better organizational ability, and improvements in institutional quality. TFP is an important measure of future growth potential and a structural transformation indicator for regional development.

Empirical results, as shown in Table 5.2, confirm that the coefficient of lagged EU funding ($Funding_{t-1}$) is positive and statistically significant at the 1% or 5% level. In the capital-based model, EU funding shows a highly significant and stable coefficient across both specifications ($\beta = 0.5014$, $p = 0.0001$ in the baseline model (Equation (1)); $\beta = 0.4940$, $p = 0.0001$ with controls (Equation (2))), indicating robust support for the physical infrastructure channel of Cohesion Policy. This coefficient means that for each one million euro increase in EU funding, total factor productivity increases by approximately 0.5 units, with productivity measured as a derived efficiency score.

In the HRST-based model, the coefficient is also statistically significant at the 5% level ($\beta = 1.2185$, $p = 0.0388$ without controls (Equation (1)); $\beta = 1.0588$, $p = 0.0302$ with controls (Equation (2))), again supporting the view that investments in human capital and innovation systems contribute meaningfully to productivity growth according to Table 5.2. Here, a one million euro increase in EU funding is associated with more than a one-unit increase in productivity derived through human capital-based estimation.

The TFP results based on Cobb-Douglas identify the importance of physical capital formation and labor efficiency while the HRST-based results foreground the catalyzing role of human capital. Collectively, both of these results support the finding of the dual nature of the impacts of EU Cohesion Policy—in terms of both physical infrastructure and knowledge-related development, as highlighted in recent regional development literature (Pieńkowski and Berkowitz, 2015; Rodríguez-Pose and Di Cataldo, 2015).

Table 5.2: Effect of EU Funding_{t-1} on Total Factor Productivity (Two Measures)

Variable	TFP (Capital-Based)		TFP (HRST-Based)	
	Baseline Model	Extended Model	Baseline Model	Extended Model
EU Funding	0.5014*** (0.0001)	0.4940*** (0.0001)	1.2185** (0.0388)	1.0588** (0.0302)
GERD	–	0.0774 (0.8933)	–	2.3600 (0.2989)
Household Income	–	0.0389 (0.3099)	–	0.6413*** (0.0001)
Observations	96	96	96	96
R-squared	0.9853	0.9857	0.9949	0.9967

Note: p-values in parentheses. * p<0.10, ** p<0.05, *** p<0.01. TFP is computed using both capital-based and HRST-adjusted production functions. The baseline models include region and year fixed effects only. The extended models additionally control for lagged Gross Expenditure on R&D (GERD) and lagged household income.

As indicated in Table 5.2, EU financing has a strong and statistically significant effect on capital-based total factor productivity with HRST adjustments, based on a separate regression run for each estimation model. The consistent and significant coefficients across both estimation models demonstrate the Cohesion Policy twofold impact mechanism, which centrally operates through physical infrastructure investment and human capital. In addition, the findings confirm that structural funds affect not only production in the short-run but can also improve regional efficiency in the long-run via human capital development and physical infrastructure.

In addition to macroeconomic indicators, the effectiveness of EU Cohesion Policy can be meaningfully assessed through its influence on firm-level dynamics. This subsection evaluates the effect of EU funding on private sector vitality across NUTS-2 regions by focusing on three key indicators: enterprise births, the birth-to-death ratio, and the enterprise growth rate. These indicators reflect the structural flexibility, market dynamism, and entrepreneurial health of regional economies (Acs et al., 2016; Audretsch and Thurik, 2001).

5.1.5. Enterprise Births

The regression analysis reveals that EU funding, lagged by one year, has a positive and statistically significant effect on the number of newly established enterprises, both

in the baseline model (Equation (1)) ($\beta = 0.00000115$, $p = 0.000$) and the extended model with controls (Equation (2)) ($\beta = 0.00000126$, $p = 0.000$), as reported in Table 5.3. This finding supports the hypothesis that cohesion policy plays an enabling role in fostering entrepreneurial activity, particularly through instruments such as startup grants, SME support schemes, and business training programs. By lowering entry barriers and improving access to financial and informational resources, EU funds stimulate business creation, especially in economically lagging regions (Fagerberg et al., 2012a; Marrocu and Paci, 2013). The numerical size of the coefficient appears small because the number of enterprise births is large in scale, but even such a small increase corresponds to dozens of new firms when funding rises by several million euros.

The effect appears particularly strong and stable even after controlling for regional innovation (GERD, $p = 0.006$) and household income conditions ($p = 0.092$), suggesting that EU funding has an independent and reinforcing impact on firm formation. This also aligns with the redistributive and capacity-building objectives of cohesion policy, particularly in structurally disadvantaged regions (Becker et al., 2018). Complementary mechanisms such as mentoring, incubation, and targeted capacity-building are also known to enhance the survival rates of newly formed businesses (Criscuolo et al., 2012).

5.1.6. Birth-to-Death Ratio

The birth-to-death ratio is a critical measure of net entrepreneurial growth, capturing both the vitality and resilience of regional business ecosystems. According to the regression results reported in Table 5.3, EU funding lagged by one year has a positive and statistically significant effect on the birth-to-death ratio, both in the baseline model (Equation (1)) ($\beta = 0.0000982$, $p = 0.0386$) and the extended model with controls (Equation (2)) ($\beta = 0.0000974$, $p = 0.0323$). This suggests that cohesion policy is not only linked to new firm creation but also contributes to lowering early-stage business failure and promoting continuity (Crescenzi et al., 2019). The coefficient implies that each one million euro increase in EU funding leads to a measurable net gain in enterprise turnover, despite the small decimal magnitude of the effect.

Importantly, the inclusion of lagged household income and GERD as control variables reveals that household income has a significant negative association with the ratio ($\beta = -0.0000565$, $p = 0.0077$), while GERD remains statistically significant. This may imply that higher-income regions already have mature markets with lower net entry rates, whereas EU funding acts as a counterbalancing force supporting entrepreneurial turnover in less developed areas.

The positive effect of funding is likely explained through multiple cohesion policy instruments that promote digital transformation, innovation adoption, advisory support, and access to business networks. Non-financial supports such as coaching, mentoring, and technical assistance appear to play a particularly important role in improving enterprise survival rates (Bruno et al., 2013).

5.1.7. Enterprise Growth Rate

The enterprise growth rate measures the capacity of existing firms to expand, innovate, and scale operations—key components of long-term regional competitiveness. The regression results, as reported in Table 5.3, show that EU funding lagged by one year has a positive and statistically significant effect on enterprise growth, both in the baseline model (Equation (1)) ($\beta = 0.00000613$, $p = 0.0050$) and in the extended model with controls (Equation (2)) ($\beta = 0.00000685$, $p = 0.0008$). This confirms that cohesion policy effectively supports firm-level expansion by providing resources for technological upgrading, operational scaling, and market diversification (Rodríguez-Pose et al., 2019; Dvouletý, 2017). While the coefficient is numerically small, it becomes economically meaningful when scaled to the size of funding, which often reaches tens or hundreds of millions of euros.

The consistency of the results across both model specifications emphasizes the robustness of the funding effect. Notably, both control variables—GERD and household income—are weakly significant but negatively associated with enterprise growth. This may reflect a saturation effect in high-income and innovation-intensive regions where baseline enterprise performance is already high.

Importantly, the strength of the EU funding effect appears to vary across regions depending on their absorptive capacity—specifically, the quality of local human capital, governance, and institutional readiness. These findings are aligned with the regional innovation systems and absorptive capacity literature, which highlight that aligning structural funds with local development pathways enhances growth outcomes (Cohen and Levinthal, 1990).

Table 5.3: Effect of EU Funding_{t-1} on Enterprise Dynamics

Variable	Enterprise Births		Birth/Death Ratio		Growth Rate	
	Baseline Model	Extended Model	Baseline Model	Extended Model	Baseline Model	Extended Model
EU Funding	0.00000115*** (0.0001)	0.00000126*** (0.0000)	0.0000982** (0.0385)	0.0000974** (0.0323)	0.00000613*** (0.0050)	0.00000685*** (0.0008)
GERD	–	–0.00000365*** (0.0061)	–	0.000495* (0.0980)	–	–0.0000168* (0.0738)
Household Income	–	0.00000015* (0.0920)	–	–0.0000565*** (0.0077)	–	–0.00000112* (0.0714)
Observations	96	96	80	80	96	96
R-squared	0.989	0.990	0.737	0.768	0.942	0.953

Note: p-values in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The baseline models include region and year fixed effects only. The extended models additionally control for lagged Gross Expenditure on R&D (GERD) and lagged household income.

As summarized in Table 5.3, *EU funding*_{t-1} has a positive and statistically significant impact across all three indicators of enterprise dynamics: firm births, the birth-to-death ratio, and the enterprise growth rate. These effects are consistently observed in both the baseline and control models, confirming the robustness of the results and reinforcing the critical role of Cohesion Policy in stimulating regional entrepreneurial activity, improving market resilience, and facilitating private sector expansion.

The persistent significance of EU funding across these firm-level measures demonstrates that Cohesion Policy not only serves to generate short-run stimulus, but is also a structural-enabler of private sector dynamism. The results indicate that EU funds support entrepreneurship, sustain and prolong firms through continuity, and foster growth trajectories—especially in regions with sufficient absorptive capacity. Ultimately, this highlights the importance of place-based strategies which combine financial instruments together with institutional and human capacity development to generate inclusive and sustained regional change.

5.2. National-Level Analysis

This section presents the panel regression findings at the country level for Bulgaria, Czechia, and Romania. The period under analysis is 2014–2020, and the main objective is to measure the macroeconomic effects of EU Cohesion Policy funds. All models are estimated using fixed effects with and without control variables (GERD and household income), allowing for the examination of both direct fund impacts and the mediating role of structural variables.

The general econometric specifications used for the national-level analysis are presented below. Equation (3) represents the baseline model, which includes only EU funding as the explanatory variable. Equation (4) extends the model by adding control variables to account for differences in innovation capacity and household income across countries.

$$Y_{it} = \alpha + \beta_1 \cdot \text{Funding}_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

$$Y_{it} = \alpha + \beta_1 \cdot \text{Funding}_{it} + \beta_2 \cdot \mathbf{X}_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (4)$$

5.2.1. Effect of EU Funding on GDP and GDP per Capita

National-level regression analysis, presented in Table 5.4, tests the relationship between funding through the EU Cohesion Policy and GDP and GDP per capita. For each of these outcomes, two models are estimated: the baseline model that includes only EU funding (Equation (3)), and the full model that also includes Gross Expenditure on R&D (GERD) and household income (Equation (4)).

In both of the baseline models, EU funding has a positive and statistically significant relationship with GDP and GDP per capita. However, the introduction of structural controls causes these relationships to collapse in significance. The relationships we observed may be explained by the underlying structures of the particular economies present in the sample rather than arising from the direct effect of funding through the EU Cohesion Policy.

In terms of the controls, household income has a robust relationship with GDP, whilst GERD and household income together are significant in their relationship with GDP per capita. These results broadly point to the significance of structural factors when explaining national income.

However, due to the low observations available ($n = 19$), it is prudent to treat these results as exploratory. On the regional scale, with greater spatial resolution and lagged structure (Funding_{t-1}), we have a stronger context for understanding the economic impacts of cohesion funding.

Table 5.4: Effect of EU Funding_t on GDP and GDP per Capita

Variable	GDP		GDP per Capita	
	Baseline Model	Extended Model	Baseline Model	Extended Model
EU Funding	5.055*** (0.010)	0.253 (0.847)	0.231** (0.025)	-0.071 (0.524)
GERD	–	-1.273 (0.812)	–	1.666*** (0.006)
Household Income	–	1.277*** (0.000)	–	0.025 (0.179)
Observations	19	19	19	19
R-squared	0.994	0.999	0.996	0.999

Note: p-values in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The baseline models include region and year fixed effects only. The extended models additionally control for Gross Expenditure on R&D (GERD) and household income.

Table 5.4 provides the economic ramifications of EU transfers does not function indirectly, but rather through structural levers, such as people’s innovation capabilities and household disposable income. Enhancing national S&T systems and disposable income can enhance the development impact of EU transfers. As such, it would be important to harness these funds toward the smart specialization and inclusive growth agendas, maximizing their long-term potential (Crescenzi and Giua, 2018a).

5.2.2. Effect of EU Funding on International Trade

Table 5.5 presents the estimated impacts of EU Cohesion Policy financial support on trade at a national level, focusing only on exports and imports. The baseline models (Equation (3)) contain only the amount of EU funding, while the model that extends this relationship (Equation (4)) contains additional controls for GERD and household income.

The baseline models reveal that EU funding is positively and significantly associated with exports and imports, indicating some temporary stimulation of the volumes of trade occurring. However, since these effects are statistically insignificant in the extended model, we infer that structural factors usually prevail in shaping likely trade outcomes.

Among the control variables, GERD maintains a strong and constant relationship with both exports and imports. Similarly, household income is statistically related to imports only, demonstrating again that innovation capacity and domestic purchasing power can

influence external trade outcomes.

Due to the limited observations ($n = 19$), results should be interpreted cautiously. At the regional level, more robust evidence can be found on the impact of lagged funding and where spatial heterogeneity can be controlled for.

Like for income-related outcomes, it seems from the results that the success of EU funding in capacity-building for trade may be dependent on complementary hard and soft investments in the national innovation system and relevant economic conditions at the household level. Aligning EU spending with these structural levers would provide extra developmental returns (Crescenzi and Giua, 2018a).

Table 5.5: Effect of EU Funding_t on International Trade Performance

Variable	Exports		Imports	
	Baseline Model	Extended Model	Baseline Model	Extended Model
EU Funding	2.563** (0.028)	-0.658 (0.523)	2.546** (0.011)	-1.046 (0.167)
GERD	–	20.720*** (0.001)	–	14.215*** (0.001)
Household Income	–	0.169 (0.308)	–	0.472*** (0.003)
Observations	19	19	19	19
R-squared	0.996	0.999	0.997	0.999

Note: p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The baseline models include region and year fixed effects only. The extended models additionally control for Gross Expenditure on R&D (GERD) and household income.

Table 5.5 presents trade outcomes are more strongly driven by structural economic factors—particularly innovation capacity and domestic purchasing power—than by EU cohesion funding alone.

5.2.3. Effect of EU Funding on FDI Stocks

Table 5.6 presents the estimated impacts of EU Cohesion Policy funding on outward and inward foreign direct investment (FDI) stocks at the national level. The baseline models (Equation (3)) include only EU funding, whilst the extended models (Equation (4)) provide additional controls for GERD and household income.

In the baseline models, EU funding is positively and statistically significantly related to both outward and inward FDI stocks, but it is important to note the significance of these coefficients disappears once we introduce structural factors. The lessening of statistical significance may suggest that EU funding influences FDI indirectly through structural mechanisms, like innovation capacity (proxied using GERD), rather than by direct investment incentives. This reading would also be consistent with the possibility that the baseline models are capturing transitory investments or are omitting long-term institutional factors.

Among the control variables, GERD has a strong positive effect on outward FDI, while household income was non-significant in all models. These results indicate the importance of domestic innovation capacity in contributing to capital outflows and attracting investment abroad.

Similar to the national level modelling provided earlier, we should be cautious in relying on these results due to the small sample size ($n = 19$). The results at the regional level, which provide the opportunity to capture heterogeneity and/or a lagged policy effect, offer a fuller picture of how EU funding contributes to investment dynamics in the long-run.

Table 5.6: Effect of EU Funding_t on Inward and Outward FDI Stocks

Variable	Outward FDI Stocks		Inward FDI Stocks	
	Baseline Model	Extended Model	Baseline Model	Extended Model
EU Funding	0.00085** (0.025)	0.00022 (0.506)	0.00221*** (0.000)	0.00112 (0.165)
GERD	–	0.00640*** (0.001)	–	0.00508 (0.126)
Household Income	–	–0.00004 (0.436)	–	0.00012 (0.323)
Observations	19	19	19	19
R-squared	0.966	0.993	0.993	0.995

Note: p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The baseline models include country and year fixed effects only. The extended models additionally control for Gross Expenditure on R&D (GERD) and household income.

Table 5.6 shows that the effects of the EU influencing FDI through the Cohesion Policy are mediated by national structural conditions such as innovation capacities or the strength of the home firm in the local domestic market.

5.2.4. Effect of EU Funding on Employment and Labor Productivity

Table 5.7 presents the national level regression estimates of EU Cohesion Policy expenditure on employment and labor productivity. The baseline models (Equation (3)) are based on only EU expenditure, while the expanded models (Equation (4)) include GERD and household income.

EU funding is positively correlated with employment across both models which means we can be confident there is a robust relationship between EU funding and short-term labor market improvements. The linkage between funding and labor productivity is weaker, and not statistically significant in the expanded model, which suggests labor productivity is less affected by funding inflows than it is by the structural conditions surrounding the funding.

Both GERD and household income have positive relationships with labor productivity in the other sample, further indicating that innovation and economic prosperity drives efficiency.

As previously mentioned as a caution in interpreting other national level results, that is we are limited by sample size. The regional level models provide a more comprehensive explanation, especially the capturing of time-differences and spatial localised effects of cohesion funding.

Table 5.7: Effect of EU Funding_t on Employment and Labor Productivity (Country-Level)

Variable	Employment		Labor Productivity	
	Baseline Model	Extended Model	Baseline Model	Extended Model
EU Funding	0.0000377*** (0.006)	0.0000295*** (0.007)	0.326* (0.080)	-0.339 (0.126)
GERD	–	-0.000134*** (0.004)	–	2.903*** (0.008)
Household Income	–	0.00000640*** (0.001)	–	0.079** (0.037)
Observations	19	19	19	19
R-squared	1.000	1.000	0.996	0.999

Note: p-values in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The baseline models include country and year fixed effects only. The extended models additionally control for Gross Expenditure on R&D (GERD) and household income.

The results in Table 5.7 imply that while EU funding may directly impact employment growth, improvements in labor productivity are more closely associated with structural factors like innovation capacity and income levels. Thus, the long-run effects of cohesion funding on productivity may hinge on complementary investments in R&D and inclusive mechanisms for income (Fagerberg et al., 2012b; Zaharia and Dogaru, 2021; Piatkowski, 2020) growth.

5.2.5. Effect of EU Funding on Total Factor Productivity

As shown in Table 5.8 the effects of EU Cohesion Policy funding for TFP, using two model specifications, a measure based on capital inputs (Case 1 Capital-Based TFP) and a measure based on human capital (Case 2 HRST-Based TFP). The baseline models (Equation (3)) includes only the EU funding, while the more extended regression which is (Equation (4)) also includes GERD and household income which acts as structural controls.

For the Capital-Based TFP, EU funding has no statistically significant effects in either model specification and control variables used modestly enhance model explanatory power. For the HRST-Based TFP model specification, the baseline model has a marginally statistically significant positive association with funding, but loses significance with the

addition of controls.

It is also relevant to highlight that both GERD and household income are significant drivers of HRST-Based TFP in the extended regression, which demonstrates the importance of both the innovation systems and levels of income to productivity growth when measuring productivity through human capital channels.

In addition to the limited size of the national-level sample ($n = 19$) these national-level results are largely exploratory. Regional-level regressions will provide a better overview of productivity implications with EU funding as they can include lag structure and spatial differentiation.

Table 5.8: Effect of EU Funding on Total Factor Productivity (Capital-Based and HRST-Based)

Variable	TFP (Capital-Based)		TFP (HRST-Based)	
	Baseline Model	Extended Model	Baseline Model	Extended Model
EU Funding	0.0000052 (0.173)	0.0000016 (0.739)	3.038* (0.085)	-3.332 (0.140)
GERD	–	-0.0000327 (0.122)	–	21.543** (0.033)
Household Income	–	0.00000196** (0.029)	–	0.954** (0.019)
Observations	19	19	19	19
R-squared	0.786	0.924	0.997	0.999

Note: p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The baseline models include country and year fixed effects only. The extended models additionally control for Gross Expenditure on R&D (GERD) and household income.

5.2.6. Effect of EU Funding on Enterprise Dynamics

Table 5.9 illustrates the results of the enterprise dynamics features including firm growth rates, birth-to-death ratios, and enterprise births. The baseline models (Equation (3)) include the actual dollars awarded from the EU only; whereas the extended models (Equation (4)) include the actual dollars awarded plus GERD and household income controls.

The results showed EU funding as significantly and positively related to firm growth for both model specifications; it does suggest some degree of a contribution to an expansion in entrepreneurial activity. The linear effect of EU funding for the birth-to-death ratio was

significant in only the baseline model, and for enterprise births there was no statistically significant relationship across both specifications. Control variables such as GERD and household income also did not have consistent effects across model specifications.

While we note the number of observations are few—especially enterprise births ($n = 16$)—and with different levels of significance, these analyses should be viewed as exploratory. Firm creation and survival might rely more on local entrepreneurial ecosystems and institutional support rather than reliant on direct funding flows. Linkage of cohesion funds with regional strategic development plans, innovation systems, and local business support infrastructures might promote the value of these funds on a sustainable basis (Crescenzi and Giua, 2018a).

Table 5.9: Effect of EU Funding on Enterprise Dynamics

Variable	Growth Rate		Birth/Death Ratio		Enterprise Births	
	Baseline	Extended	Baseline	Extended	Baseline	Extended
EU Funding	0.00000336*** (0.010)	0.00000376* (0.095)	0.0000633** (0.019)	0.0000688 (0.173)	0.00000185 (0.264)	0.00000147 (0.595)
GERD	–	-0.0000101 (0.245)	–	-0.000148 (0.448)	–	-0.0000127 (0.107)
Household Income	–	0.00000022 (0.503)	–	0.0000033 (0.657)	–	0.00000048 (0.102)
Observations	19	19	19	19	16	16
R-squared	0.928	0.947	0.800	0.825	0.983	0.996

Note: p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The baseline models include country and year fixed effects only. The extended models additionally control for Gross Expenditure on R&D (GERD) and household income.

5.3. Comparative Interpretation of Regional and National-Level Results

Although regional and national models examined similar indicators, their outputs are remarkably different. First, the temporal structure can explain the stated difference in outputs: regional regressions lag funding (Funding_{t-1}) capturing the effects over the medium-term, while national models capture contemporaneous funding (Funding_t) effects identifying immediate spatial effects.

Continuing to account for differences, regional models include region-fixed effects that identify some unobserved variables and account for unobserved heterogeneity (e.g., regional infrastructures, regional governance, and regional innovation ecosystems)—in the case of the national models, fixed effects are captured at the country level and aggregate

different regional-level conditions that dilute meaningful variation within the country.

For these reasons, regional models are inherently more robust and statistically significant across indicators, which draws attention to the contribution of spatial level indicators and time-lagged effects in assessing EU Cohesion Policy. Analysis based on a macro-level lens, like what national analysis offers, lacks the precision that an analysis based at the regional-level can provide regarding the spatial equity and effectiveness of funded interventions.



6 | Conclusion

This final chapter consolidates the empirical results, theoretical insights, and tactical considerations of the thesis. The chapter seeks to consider the wider implications of EU Cohesion Policy funding for regional and national development in Czechia, Bulgaria, and Romania, and it identifies some key mechanisms that convert funding into economic performance. Specifically, attention will be given to considerations of spatial and institutional variation, temporal lag effects, and the differences in the absorptive capacity of different regions. The chapter integrates analytical results and policy implications as it provides both a recap of contributions and a look ahead. The sections that follow will outline the principal findings and provide an analysis of their implications for cohesion policy design and propose some possible avenues for future research in light of the empirical and methodological limitations that have been highlighted.

6.1. Summary of Findings and Contributions

This thesis investigated the economic outcomes associated with European Union Cohesion Policy funding in Czechia, Bulgaria and Romania in the 2014–2020 programming period, with a particular emphasis on regional-level impacts. The use of panel datasets, generated at both the national and NUTS-2 regional levels, allowed for an assessment of the impact of any cohesion funding on a range of economic outcomes, including GDP, employment, and productivity, and also enterprise dynamism (Mendez, 2013; Crescenzi et al., 2016).

At the regional level, EU funding has structural impacts that are statistically significant and spatially consistent. Fixed-effects models estimated with lagged ($t-1$) funding variables show that the impact is strong and significant (and often substantial) on Total Factor Productivity (TFP), labor productivity, GDP, employment rate and enterprise growth rate (Fratesi and Perucca, 2019b). The data clearly illustrate structural impacts that take time to materialize, and are moderated by things like the institutional capacity, quality of project implementation, and the absorptive capacity of the regions (Bachtler et al., 2016b). Furthermore, the findings highlight the importance of understanding the

need for using lagged econometric structures in assessing the effectiveness of policies in transition economies (Piatkowski, 2020).

At the national level the results are more complicated. In the baseline model without any control variables, all indicators (with the exception of Enterprise Births and TFP (capital-based)) are positively and significantly responsive to EU funding. However, with the inclusion of the control variables GERD and household income into the model, most indicators ceased to be significant. Only employment and enterprise growth rate statistics appear in the extended model. This indicates that although some of the macro-level differences are clear, the strongest and most consistent impact of the cohesion policy is most easily evident at the regional level (Hall et al., 2010; Rodríguez-Pose, 2013b).

The thesis provides a dual-method approach for measurement of Total Factor Productivity (TFP) which is contained in two different measures: one based on a Cobb-Douglas production function involving capital data, and another approach based on human resources in science and technology (HRST) in order to capture human capital impacts (Radosevic, 2013). At the regional level, there is a significant relationship between the capital-based measure of TFP and the cohesion funding, and a lesser significance with the HRST measure. Nevertheless, at the national level, neither measure demonstrated any significance once the controls were included, which would indicate that the human capital impacts of cohesion funding are likely more complicated, indirect, and that a larger degree of complexity is probably much more scale-sensitive than physical capital investments (Fagerberg et al., 2012b).

This investigation adds to the empirical literature through reference to entrepreneurship-related dynamics (enterprise birth rates, death rates and growth rates) as indicators of economic vitality at the regional scale. The results imply that cohesion funding has played a better role in supporting ‘survival’ and ‘growth’ of firms, than an actual realisation of new firm births. This is most evident in structurally lagging locations like North-East Romania and South-Central Bulgaria (Zaharia and Dogaru, 2021). In these context, economic revitalisation relies more on supporting existing entrepreneurial activity, than it does creating new entrepreneurs (Audretsch and Fritsch, 2002b).

The data strategy of the thesis is based on annual allocation data from the Kohesio database, as expense data at the project level were not available. As the research must rely on aggregate funding data, it uses funding information, as well as visual representations like scatter plots, radar charts, and typologies of clusters to show the disparities in terms of institutions and funding absorption ability by NUTS-2 regions (European Commission, 2022a). The similarity of the analysis for regional comparisons begins well without having

disaggregated financial data.

The research has also supported a number of theoretical frameworks. Convergence theory is only relevant in the existence of sufficient institutional and administrative capacity (Ciani and Imbrogno, 2022b). Institutional economics is highlighted by the degree of governance as well as absorptive capacity—as demonstrated by the values associated with GERD and household income, while New Economic Geography (NEG) is referenced by agglomerations of urban areas such as Prague, Sofia and Cluj-Napoca that function as growth poles and the spillover of productivity to the surrounding regions (Bristow and Healy, 2014b).

In summary, the thesis highlights that the efficacy of this policy is highly contextual, and emerges only when viewed through spatially disaggregated, temporally conditional and multidimensional contexts. The use of lagged econometric models orienting regional performance indicators contribute significantly to the literature on place-based development and the territorial logic of EU investment policy (Crescenzi and Giua, 2018b).

6.2. Reflections and Concluding Remarks

This thesis explored the driving role of EU Cohesion Policy funding in regional and national economic development in three structurally different Member States: Czechia, Bulgaria, and Romania. This thesis does not think of the funding effects in singular terms (i.e., immediate, homogeneous), but acknowledges that the effects are complex—this includes identifying temporal lags, institutional unevenness, and territorial variations in a multi-dimensional and spatially disaggregated manner.

The contribution of the research is in documenting the empirical results but also the structure that is offered for valuing cohesion policy impacts in institutionally heterogeneous and spatially uneven contexts. In particular, the three-tier analysis—comprising national and sub-national levels, firm-level dynamics, and dual-method approaches to productivity—suggests the idea of granularity, temporality, and territorial specificity for policy evaluation.

As a methodology, which included lagged panel regression models supported by visual analytical tools, this thesis provides a scalable and replicable strategy for the assessment of EU funding efficiency in the future. This strategy encourages both scholars and policymakers alike, to make use of the funding data as more than just a single headline indicator, but also to examine the underlying structural conditions, including absorptive capacity, entrepreneurship, and the quality of governance.

Remarkably, these findings recommend a reconsideration of how we define and measure success in cohesion policy—moving away from a preoccupation devoted to fund absorption rates or more recent GDP growth, and putting more focus on longer-term transformation (e.g. improvements in productivity (especially TFP), sustainable enterprise development, institutional learning at the regional level, etc.).

In summary, this thesis advances the discussion on regional convergence not merely by providing new empirical evidence, but by providing for a more adaptive, differentiated and place-based evaluation culture to inform cohesion strategy. While the European Union contends with new challenges (climate transition; digital equality; etc.), so too should cohesion policy evolve, along with the analytical tools used to inform and assess it.

6.3. Policy Implications and Territorial Insights

The results of this thesis provide practical, evidence-based implications to help shape the future of EU regional development policy. Cohesion Policy remains a key tool in facilitating economic development, but the analysis shows that financial transfers are not the only solution in achieving convergence on the economic front. In fact, the positive impact from this funding is influenced heavily by contextual factors, in particular institutional quality, absorptive capacity, and the strategic fit of regions receiving support from regional variety within the Union.

Overall, there is ample evidence of enduring inequalities amongst structurally lagging areas such as North-East Romania and South-Central Bulgaria and urban regions like Cluj-Napoca and Sofia, with access to high levels of EEC financial support. While funding is a necessary condition, underperforming regions remain laggards due to unending weaknesses in governance, low absorptive capacity, and limited project delivery, while growth hubs have used these funds more effectively towards enterprise development and capital build-up.

These patterns demonstrate that territorial inequality across the EU is not just geographically distinct but is also institutionally unequal. Lagging regions and their respective authorities usually do not possess the necessary expertise, administrative structures, technical knowledge, or fiscal capacity needed for the effective development of regional strategies or indeed any planning for development at all. This supports the thesis' reasoning that Cohesion Policy should move forwards with a more differentiated, performance-differentiated, and context-referent approach of regional policy in the future.

In order to increase the contribution Cohesion Policy makes to regional development,

future EU Cohesion Policy needs to consider several strategic priorities. First, it should make funding outcomes about implementations, not about allocation rewards; that is, funding should be linked to measurable outcomes such as improvements in total factor productivity (TFP) and enterprise survival rate. Second, it must work with national governments to provide stable investment in both institutional and technical capacity building, including public administration reform, reforming planning systems, and developing routine digital planning tools. Third, it should address institutional bottlenecks in lagging regions by structuring the operational programs on structural reforms aligned with the EU priorities. Finally, it should enable a place-focused governance template based on “place-led” characteristics, focusing on enterprise adaptive sectoral potentials and structural constraints recognised at the NUTS-2 level.

Funding must be accompanied by investment; a priority area for future Cohesion Policy would be investments associated with productivity gains, also associated with smart-specialisation, entrepreneurship ecosystems, and digital infrastructures.

Ultimately, Cohesion Policy is about much more than just the total quantum of money it gives away. Its real success is about how well, effectively, are we using public funds to develop regional capabilities knowing that are different, unique, unjust and uneven across Europe’s regional geographies. An intelligent and reflexive approach and vision, focused on territorial specificity and institutional capability, is a necessity for the transformative functions of Clay’s Cohesion Policy.

6.4. Strategic Implications and Directions for Future Research

The empirical evidence presented in this thesis highlights both the transformative potential and the practical constraints of EU Cohesion Policy across heterogeneous regional landscapes. While funding allocations play a foundational role, their success is highly contingent upon territorial characteristics—particularly the strength of local institutions, governance quality, and absorptive capacity (Rodríguez-Pose, 2013a; Charron et al., 2014).

Persistent disparities between innovation-driven urban centers—such as Cluj-Napoca, Prague, and Sofia—and structurally lagging regions like North-East Romania or South-Central Bulgaria reflect the uneven geography of institutional functionality (Iammarino et al., 2019; Crescenzi and Giua, 2016). These disparities are not only economic but embedded in administrative capacity, human capital distribution, and strategic planning systems. As such, cohesion policy must transcend uniform distribution models and em-

brace a differentiated, performance-oriented, and institutionally grounded logic (Bachtler et al., 2017).

To maximize impact, future cohesion strategies should reward institutional effectiveness, not only financial absorption or demographic need (Ederveen et al., 2006); support administrative modernization in underperforming regions through targeted technical assistance, training, and digital governance infrastructure (Mendez and Bachtler, 2022); align investments with broader EU transitions, particularly the Green Deal and Digital Europe frameworks (Commission, 2021); and promote place-based governance models that reflect regional capabilities, sectoral profiles, and socio-economic challenges (Barca, 2009).

At the same time, this research acknowledges several limitations that present opportunities for further exploration. First, the analysis did not disaggregate cohesion funding by sector due to data availability constraints. Sectoral heterogeneity—particularly across manufacturing, services, and agriculture—may significantly shape the effectiveness of policy investments (Percoco, 2017). Future research should pursue more granular data on fund allocation by sector and project type.

Second, while HRST was employed as a proxy in the dual TFP estimation strategy, it was not used as a control variable in the econometric models. As a result, the broader institutional and labor market impacts of human capital could not be fully assessed. Future work may consider integrating HRST alongside governance and education indicators to capture these mechanisms more comprehensively (Rodríguez-Pose and Cataldo, 2015).

Third, the empirical approach relied on fixed-effects panel regression and did not account for spatial spillovers or regional interdependencies. Given that cohesion policy is explicitly designed to reduce territorial inequalities, incorporating spatial econometric techniques—such as spatial lag or spatial error models—could significantly enrich future evaluations of policy diffusion and cross-regional learning (Bouayad-Agha et al., 2013; Fratesi and Perucca, 2019a).

Lastly, this thesis focuses on the 2014–2020 programming period. Although analytically useful, this captures only a single phase of a multi-cycle policy framework. Longitudinal studies spanning multiple EU budget cycles would offer stronger insights into cumulative effects, delayed responses, and institutional learning over time, particularly in regions with slower absorption trajectories (Piatkowski and Grosse, 2020; Bachtler et al., 2016a).

In summary, this research confirms that cohesion policy holds substantial potential as a catalyst for regional transformation—but only when embedded within territorially

intelligent, institutionally robust, and evidence-based frameworks. The future of EU cohesion depends not just on where money flows, but on how strategically, adaptively, and equitably it is translated into regional development outcomes.



Bibliography

- European Commission. Cohesion policy: Investing in europe's regions, 2023a. URL https://ec.europa.eu/regional_policy/en/. Accessed: 2025-05-22.
- European Commission. Cohesion policy 2021–2027, 2023b. URL <https://cohesiondata.ec.europa.eu>. Accessed: 2025-05-22.
- Fabrizio Barca. An agenda for a reformed cohesion policy: A place-based approach to meeting european union challenges and expectations. Technical report, European Commission, 2009. URL https://ec.europa.eu/regional_policy/archive/policy/future/pdf/report_barca_v0306.pdf. Independent Report prepared for the European Commissioner for Regional Policy.
- John Bachtler and Irene McMaster. Eu cohesion policy and the role of the regions: Investigating the influence of structural funds in the new member states. *Environment and Planning C: Government and Policy*, 26(2):398–427, 2008. doi: 10.1068/c0662.
- European Commission. Cohesion policy and the use of financial instruments, 2020. URL https://ec.europa.eu/regional_policy/sources/thefunds/fin_inst/pdf/financial_instruments_2020.pdf. Accessed: 2025-05-22.
- European Commission. Cohesion policy 2021–2027, 2021. URL https://ec.europa.eu/regional_policy/en/2021_2027/. Accessed: 2025-05-22.
- Robert M. Solow. A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1):65–94, 1956. doi: 10.2307/1884513.
- Paul M. Romer. Endogenous technological change. *Journal of Political Economy*, 98(5): S71–S102, 1990. doi: 10.1086/261725.
- Douglass C. North. *Institutions, Institutional Change and Economic Performance*. Cambridge University Press, Cambridge, 1990. ISBN 9780521397346.
- Paul Krugman. Increasing returns and economic geography. *Journal of Political Economy*, 99(3):483–499, 1991. doi: 10.1086/261763.

- Sjef Ederveen, Henri L. F. de Groot, and Richard Nahuis. Fertile soil for structural funds? a panel data analysis of the conditional effectiveness of european cohesion policy. *Kyklos*, 59(1):17–42, 2006. doi: 10.1111/j.1467-6435.2006.00317.x.
- Andrés Rodríguez-Pose and Ugo Fratesi. Between development and social policies: The impact of european structural funds in objective 1 regions. *Regional Studies*, 38(1): 97–113, 2004. doi: 10.1080/00343400310001632226.
- Riccardo Crescenzi and Maria Giua. One or many cohesion policies of the european union? on the differential economic impacts of cohesion policy across member states. *Regional Studies*, 54(1):10–20, 2020. doi: 10.1080/00343404.2018.1551615.
- Sascha O. Becker, Peter H. Egger, and Maximilian von Ehrlich. Going nuts: The effect of eu structural funds on regional performance. *Journal of Public Economics*, 94(9–10): 578–590, 2010. doi: 10.1016/j.jpubeco.2010.06.006.
- Philipp Mohl and Tobias Hagen. Do eu structural funds promote regional growth? new evidence from various panel data approaches. *Regional Science and Urban Economics*, 40(5):353–365, 2010. doi: 10.1016/j.regsciurbeco.2010.03.005.
- European Commission. Kohesio: Eu-funded projects in all eu regions. <https://kohesio.ec.europa.eu>, 2022a. URL <https://kohesio.ec.europa.eu>. Accessed: 27 May 2025.
- Willem Molle. *European Cohesion Policy*. Routledge, London, 2nd edition, 2007. ISBN 9780415415967. URL <https://www.routledge.com/European-Cohesion-Policy/Molle/p/book/9780415415967>.
- Riccardo Crescenzi and Maria Giulia Di Giua. The institutional foundations of regional growth—evidence from european regions. *Regional Studies*, 50(7):1018–1034, 2016. doi: 10.1080/00343404.2015.1119264.
- Robert J. Barro. Government spending in a simple model of endogenous growth. *Journal of Political Economy*, 98(5):S103–S125, 1990. doi: 10.1086/261726.
- Riccardo Crescenzi and Andrés Rodríguez-Pose. The geography of innovation in the european union: cohesion policy, institutions, and entrepreneurship. *Regional Studies*, 51(9):1408–1423, 2017. doi: 10.1080/00343404.2016.1262010.
- Andrés Rodríguez-Pose and Marco Di Cataldo. Quality of government and innovative performance in the regions of europe. *Journal of Economic Geography*, 15(4):673–706, 2015. doi: 10.1093/jeg/lbu023.
- Sascha O. Becker, Peter H. Egger, and Maximilian von Ehrlich. Effects of eu regional

- policy: 2000–06 and 2007–13. *Regional Science and Urban Economics*, 69:143–152, 2018. doi: 10.1016/j.regsciurbeco.2017.01.004.
- Raluca Zaharia, Adriana Grigorescu, Mihaela Dima, and Cristian Ionescu. Cohesion policy and its effects on regional development in the european union—a systematic literature review. *Sustainability*, 13(2):1–22, 2021a. doi: 10.3390/su13020765.
- Nicholas Charron, Lewis Dijkstra, and Victor Lapuente. Regional governance matters: Quality of government within european union member states. *Regional Studies*, 48(1): 68–90, 2014. doi: 10.1080/00343404.2013.770141.
- Roxana Maria Zaharia, Alexandru Mihai Baltag, and Adriana Grigorescu. The role of eu funds in regional development and convergence: Empirical evidence from romania. *Sustainability*, 13(13):7342, 2021b. doi: 10.3390/su13137342.
- Masahisa Fujita, Paul Krugman, and Anthony J. Venables. *The Spatial Economy: Cities, Regions and International Trade*. MIT Press, Cambridge, MA, 1999. ISBN 9780262062027.
- Sihem Bouayad-Agha, Nathalie Turpin, and Lionel Vedrine. Fostering the development of european regions: A spatial dynamic panel data analysis of the impact of cohesion policy. *Regional Studies*, 47(9):1573–1593, 2013. doi: 10.1080/00343404.2011.653332.
- Ugo Fratesi and Giovanni Perucca. Eu regional policy effectiveness and the role of territorial capital. *Papers in Regional Science*, 99(1):25–41, 2020.
- Andrés Rodríguez-Pose. The revenge of the places that don’t matter (and what to do about it). *Cambridge Journal of Regions, Economy and Society*, 11(1):189–209, 2018. doi: 10.1093/cjres/rsx024.
- Simona Iammarino, Andrés Rodríguez-Pose, and Michael Storper. Regional inequality in europe: Evidence, theory and policy implications. *Journal of Economic Geography*, 19(2):273–298, 2019. doi: 10.1093/jeg/lby021.
- John Bachtler, Carlos Mendez, and Fiona Wishlade. Eu cohesion policy and the reform agenda: Past experiences and future perspectives. *National Institute Economic Review*, 225(1):R53–R67, 2013. doi: 10.1177/002795011322500106.
- Marcin Piatkowski and Tomasz G. Grosse. Does eu cohesion policy work? theory and evidence. *Studia Regionalne i Lokalne*, 81(3):5–25, 2020. doi: 10.7366/1509499538101.
- Riccardo Crescenzi and Maria Giua. *Innovation and Regional Growth in the European Union*. Edward Elgar Publishing, Cheltenham, 2011. ISBN 9781849801138.

- Carlos Mendez and John Bachtler. Eu cohesion policy after 2020: A new policy architecture and the challenge of administrative capacity. *Regional Studies*, 56(1):161–173, 2022. doi: 10.1080/00343404.2021.1934386.
- Andrés Rodríguez-Pose. Do institutions matter for regional development? *Regional Studies*, 47(7):1034–1047, 2013a. doi: 10.1080/00343404.2012.748978.
- Ugo Fratesi and Giovanni Perucca. Territorial capital and the resilience of european regions. *Annals of Regional Science*, 63(3):633–653, 2019a. doi: 10.1007/s00168-019-00932-6.
- European Commission. Cohesion in europe towards 2050 – eighth report on economic, social and territorial cohesion. https://ec.europa.eu/regional_policy/en/information/cohesion-report/, 2022b. Available at: https://ec.europa.eu/regional_policy/en/information/cohesion-report/.
- Michele Boldrin and Fabio Canova. Inequality and convergence in europe’s regions: Reconsidering european regional policies. *Economic Policy*, 16(32):205–253, 2001. doi: 10.1111/1468-0327.00078.
- Roberto Camagni and Roberta Capello. Rationale and design of eu cohesion policies in a period of crisis with special reference to ceecs. *Annals of Regional Science*, 54(1):3–22, 2015. doi: 10.1007/s00168-014-0654-8.
- Ugo Fratesi. The impact of eu cohesion policy on european regions during the crisis: What factors matter? *Regional Studies*, 54(1):1–12, 2020. doi: 10.1080/00343404.2019.1648768.
- John Bachtler, Carlos Mendez, and Fiona Wishlade. From conditionality to europeanization in central and eastern europe: Administrative performance and capacity in cohesion policy. *European Planning Studies*, 25(1):35–56, 2017. doi: 10.1080/09654313.2016.1228867.
- Julián Ramajo, M. Ángeles Márquez, Geoffrey J. D. Hewings, and María Martín Salinas. Spatial heterogeneity and interregional spillovers in the european union: Do cohesion policies encourage convergence across regions? *European Economic Review*, 52(3): 551–567, 2008. doi: 10.1016/j.eurocorev.2007.05.002.
- Vassilis Monastiriotis. Regional growth and national development: Transition in central and eastern europe and the regional kuznets curve in the east and the west. *Spatial Economic Analysis*, 9(2):152–181, 2014. doi: 10.1080/17421772.2014.910166.
- Ugo Fratesi and Fiona Wishlade. The eu cohesion policy after 2020: A new design for an

old policy? IQ-Net Review Paper 41(2), European Policies Research Centre, University of Strathclyde, Glasgow, 2017. URL <https://eprc-strath.eu/publications/iq-net-review-paper-41-2-the-eu-cohesion-policy-after-2020/>. Accessed: 2025-05-22.

David B. Audretsch and Michael Fritsch. Growth regimes over time and space. *Regional Studies*, 36(2):113–124, 2002a. doi: 10.1080/00343400220121909.

Dane Stangler and Robert E. Litan. Where will the jobs come from? https://www.kauffman.org/wp-content/uploads/2009/11/where_will_the_jobs_come_from.pdf, 2009. Available at: https://www.kauffman.org/wp-content/uploads/2009/11/where_will_the_jobs_come_from.pdf.

Edoardo Ciani and Alessandro Imbrogno. Do eu funds boost regional growth? evidence from the 2007–2013 programming period. *Journal of Regional Science*, 62(3):643–675, 2022a. doi: 10.1111/jors.12544.

Marta Postuła and Piotr Janusz. Efficiency of the implementation of european union funds in the light of the quality of governance in the eu member states. *Sustainability*, 13(4):2107, 2021. doi: 10.3390/su13042107.

European Commission. The rhomolo model: A dynamic spatial general equilibrium model for assessing the impact of cohesion policy. Technical Report JRC111861, Joint Research Centre, European Commission, Seville, 2018. URL <https://publications.jrc.ec.europa.eu/repository/handle/JRC111861>. JRC Working Papers on Territorial Modelling and Analysis.

Ugo Fratesi and Andrés Rodríguez-Pose. The effectiveness of cohesion policy and conditional factors: An assessment for european regions. *Regional Studies*, 50(7):1217–1233, 2016. doi: 10.1080/00343404.2015.1100286.

European Commission. React-eu: Recovery assistance for cohesion and the territories of europe. European Commission, Cohesion Policy Brief, 2021a. URL https://ec.europa.eu/regional_policy/en/newsroom/funding-and-financial-tools/react-eu/. Available at: https://ec.europa.eu/regional_policy/en/newsroom/funding-and-financial-tools/react-eu/.

Gillian Bristow and Adrian Healy. Regional resilience: An agency perspective. *Regional Studies*, 48(5):923–935, 2014a. doi: 10.1080/00343404.2013.854879.

European Commission. Cohesion in europe towards 2050: Eighth report on economic, social and territorial cohesion. European Commission, Cohesion Policy

- Report, 2021b. URL https://ec.europa.eu/regional_policy/en/information/cohesion-report/. Available at: https://ec.europa.eu/regional_policy/en/information/cohesion-report/.
- World Bank. *World Development Report 2022: Finance for an Equitable Recovery*. World Bank Publications, Washington, DC, 2022. ISBN 9781464817304. doi: 10.1596/978-1-4648-1730-4. URL <https://www.worldbank.org/en/publication/wdr2022>.
- John Bachtler and Carlos Mendez. *EU Cohesion Policy and European Integration: The Dynamics of EU Budget and Regional Policy Reform*. Ashgate Publishing / Routledge, Abingdon, UK, 2016. ISBN 9781138247776.
- Marcin Piatkowski. *Europe's Growth Champion: Insights from the Economic Rise of Poland*. Oxford University Press, Oxford, 2018. ISBN 9780198789345. doi: 10.1093/oso/9780198789345.001.0001. URL <https://global.oup.com/academic/product/europes-growth-champion-9780198789345>.
- Slavo Radosevic and Erkan Yoruk. Entrepreneurial propensity of innovation systems: Theory, measurement and policy implications. *Research Policy*, 42(6–7):1015–1038, 2013. doi: 10.1016/j.respol.2013.01.011.
- Guido Pellegrini, Fabio Terribile, Ornella Tarola, Teodoro Muccigrosso, and Francesco Busillo. Measuring the effectiveness of cohesion policy: Evidence from the italian objective 1 regions. *Regional Studies*, 47(9):1346–1360, 2013. doi: 10.1080/00343404.2012.709607.
- European Commission. My region, my europe, our future: Seventh report on economic, social and territorial cohesion, 2017. URL https://ec.europa.eu/regional_policy/en/information/cohesion-report/. Accessed: 2025-05-22.
- David B. Audretsch. *The Entrepreneurial Society: A Reform Strategy for the European Union*. Oxford University Press, Oxford, 2005. ISBN 9780195182644.
- Andrés Rodríguez-Pose and Enrique Garcilazo. Quality of government and the returns of investment: Examining the impact of cohesion expenditure in european regions. *Regional Studies*, 49(8):1274–1290, 2015. doi: 10.1080/00343404.2015.1007933.
- Riccardo Crescenzi, Marco Di Cataldo, and Maria Giua. Fdi inflows in europe: Does investment promotion work? *Journal of International Economics*, 127:103384, 2020. doi: 10.1016/j.jinteco.2020.103384.
- Fabrizio Barca, Philip McCann, and Andrés Rodríguez-Pose. The case for regional development intervention: Place-based versus place-neutral approaches. In John Bachtler,

- Ugo Fratesi, Philippe Monfort, and Tatjana Muravska, editors, *Territorial Cohesion in Europe*, pages 43–70. Edward Elgar Publishing, Cheltenham, 2012. ISBN 9780857932717.
- John Bachtler, Carlos Mendez, and Fiona Wishlade. Evolution or revolution? exploring new ideas for cohesion policy post-2020. *European Structural and Investment Funds Journal*, 4(3):125–138, 2016a.
- OECD. *Productivity and Jobs in a Globalised World: (How) Can All Regions Benefit?* OECD Publishing, Paris, 2020. doi: 10.1787/9789264269231-en. URL <https://doi.org/10.1787/9789264269231-en>.
- European Commission. 8th report on economic, social and territorial cohesion, 2022c. URL https://ec.europa.eu/regional_policy/sources/docoffic/official/reports/cohesion8/8cr_full_report_en.pdf. Accessed: 2025-05-22.
- Marco Percoco. Impact of european cohesion policy on regional growth: Does local economic structure matter? *Regional Studies*, 51(6):833–843, 2017. doi: 10.1080/00343404.2016.1216953.
- Riccardo Crescenzi and Andrés Rodríguez-Pose. *Innovation and Regional Growth in the European Union*. Springer, Berlin, 2011.
- Lewis Dijkstra, Enrique Garcilazo, and Philip McCann. The effects of the global financial crisis on european regions and cities. *Journal of Economic Geography*, 15(5):935–949, 2015. doi: 10.1093/jeg/lbv004.
- Julian Pieńkowski and Peter Berkowitz. Econometric assessments of cohesion policy growth effects: How to make them more relevant for policy makers? DG REGIO Working Paper 02/2015, European Commission, Directorate-General for Regional and Urban Policy, Brussels, 2015. URL https://ec.europa.eu/regional_policy/sources/docgener/work/2015_02_econo_assess_cohesion.pdf. Accessed: 2025-05-22.
- Zoltan J. Acs, David B. Audretsch, Erik E. Lehmann, and Georg Licht. National systems of entrepreneurship. *Small Business Economics*, 46(4):527–535, 2016. doi: 10.1007/s11187-016-9705-1.
- David B. Audretsch and A. Roy Thurik. What’s new about the new economy? sources of growth in the managed and entrepreneurial economies. *Industrial and Corporate Change*, 10(1):267–315, 2001. doi: 10.1093/icc/10.1.267.
- Jan Fagerberg, Martin Srholec, and Bart Verspagen. Innovation and economic development. In Bronwyn H. Hall and Nathan Rosenberg, editors, *Handbook of the*

- Economics of Innovation*, volume 2, pages 833–872. Elsevier, 2012a. doi: 10.1016/B978-0-444-53609-5.00006-0.
- Emanuela Marrocu and Raffaele Paci. Different approaches to the analysis of regional convergence: Empirical evidence from the eu cohesion policy. *Journal of Regional Science*, 53(1):1–28, 2013. doi: 10.1111/jors.12003.
- Chiara Criscuolo, Ralf Martin, Henry G. Overman, and John Van Reenen. The causal effects of an industrial policy. Technical Report 17842, National Bureau of Economic Research, 2012. URL <https://www.nber.org/papers/w17842>.
- Riccardo Crescenzi, Maria Giua, and Giovanna V. Sonzogno. Mind the gap: Eu cohesion policy and the socio-economic divide in europe. *Papers in Regional Science*, 98(4):1635–1666, 2019. doi: 10.1111/pirs.12443.
- Nicolas Bruno, Marie-Jeanne Savoie, and Andreas Ruckstuhl. Resilience of new businesses: The role of non-financial support. Technical Report 2013/07, OECD Local Economic and Employment Development (LEED) Programme, 2013. URL <https://doi.org/10.1787/5k3x2bz1x28v-en>. Accessed: 2025-05-22.
- Andrés Rodríguez-Pose, Riccardo Crescenzi, and Marco Di Cataldo. Institutions and the productivity challenge for european regions. *Regional Studies*, 53(1):1–11, 2019. doi: 10.1080/00343404.2018.1447767.
- Ondřej Dvouletý. Can public support for micro-enterprises increase their success rate? evidence from czech panel data. *Journal of Small Business and Enterprise Development*, 24(3):653–673, 2017. doi: 10.1108/JSBED-02-2017-0042.
- Wesley M. Cohen and Daniel A. Levinthal. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1):128–152, 1990. doi: 10.2307/2393553.
- Riccardo Crescenzi and Maria Giua. One or many cohesion policies of the european union? on the differential economic impacts of cohesion policy across member states. *Regional Studies*, 54(1):10–20, 2018a. doi: 10.1080/00343404.2018.1522099.
- Jan Fagerberg, Martin Srholec, and Bart Verspagen. Innovation and economic development. In Jan Fagerberg, David C. Mowery, and Richard R. Nelson, editors, *The Oxford Handbook of Innovation*, pages 833–866. Oxford University Press, Oxford, 2012b. doi: 10.1093/oxfordhb/9780199286805.003.0020.
- Roxana Zaharia and Tatiana-Camelia Dogaru. Rdi and regional competitiveness in roma-

- nia in the context of eu2020. *Sustainability*, 13(4):1932, 2021. doi: 10.3390/su13041932. URL <https://www.mdpi.com/2071-1050/13/4/1932>.
- Marcin Piatkowski. *Europe's Growth Champion: Insights from the Economic Rise of Poland*. Oxford University Press, Oxford, 2020. ISBN 9780198789345. doi: 10.1093/oso/9780198789345.001.0001. URL <https://global.oup.com/academic/product/europes-growth-champion-9780198789345>.
- Carlos Mendez. The post-2013 reform of eu cohesion policy and the place-based narrative. *Journal of European Public Policy*, 20(5):639–659, 2013. doi: 10.1080/13501763.2012.736733.
- Riccardo Crescenzi, Davide Luca, and Simona Milio. Labour mobility and eu cohesion policy: Boosting regional growth and entrepreneurship. *Journal of Economic Geography*, 17(1):111–137, 2016. doi: 10.1093/jeg/lbv041.
- Ugo Fratesi and Giovanni Perucca. Territorial capital and the resilience of european regions. *Annals of Regional Science*, 62(1):1–23, 2019b. doi: 10.1007/s00168-019-00906-5.
- John Bachtler, Peter Berkowitz, Sally Hardy, and Tatjana Muravska, editors. *EU Cohesion Policy: Reassessing Performance and Direction*. Routledge, Abingdon, UK, 2016b. ISBN 9781138853717. URL <https://www.routledge.com/EU-Cohesion-Policy-Reassessing-Performance-and-Direction/Bachtler-Berkowitz-Hardy-Muravska/p/book/9781138853717>.
- Bronwyn H. Hall, Francesca Lotti, and Jacques Mairesse. Innovation and productivity in smes: Empirical evidence for italy. *Small Business Economics*, 33(1):13–33, 2010. doi: 10.1007/s11187-009-9184-8.
- Andrés Rodríguez-Pose. Do institutions matter for regional development? *Regional Studies*, 47(7):1034–1047, 2013b. doi: 10.1080/00343404.2012.748978.
- Slavo Radošević. *Innovation and Development: The Evidence from Economic Transition in Central and Eastern Europe*. Edward Elgar Publishing, Cheltenham, UK, 2013. ISBN 9781781951996. URL <https://www.e-elgar.com/shop/gbp/innovation-and-development-9781781951996.html>.
- David B. Audretsch and Michael Fritsch. Growth regimes over time and space. *Regional Studies*, 36(2):113–124, 2002b. doi: 10.1080/00343400220121909.
- Edoardo Ciani and Alessandro Imbrogno. Do eu funds boost regional growth? evidence from the 2007–2013 programming period. *Journal of Regional Science*, 62(3):643–675, 2022b. doi: 10.1111/jors.12544. URL <https://doi.org/10.1111/jors.12544>.

Gillian Bristow and Adrian Healy. Regional resilience: An agency perspective. *Regional Studies*, 48(5):923–935, 2014b. doi: 10.1080/00343404.2013.854879. URL <https://doi.org/10.1080/00343404.2013.854879>.

Riccardo Crescenzi and Maria Giua. One or many cohesion policies of the european union? on the differential economic impacts of cohesion policy across member states. *Regional Studies*, 54(1):10–20, 2018b. doi: 10.1080/00343404.2018.1522099. URL <https://doi.org/10.1080/00343404.2018.1522099>.

Andrés Rodríguez-Pose and Marco Di Cataldo. Quality of government and innovative performance in the regions of europe. *Journal of Economic Geography*, 15(4):673–706, 2015. doi: 10.1093/jeg/lbu023.

Appendix A:

Full Names of Abbreviated NUTS-2 Regions

Czechia

Abbreviation	Full Region Name
Praha	Hlavní město Praha
Stř. Čechy	Střední Čechy
Severozáp.	Severozápad
Severových.	Severovýchod
Jihozáp.	Jihozápad
Jihovýchod	Jihovýchod
Jihových.	Jihovýchod
Stř. Morava	Střední Morava
Česko	Česká republika (national average)

Romania

Abbreviation	Full Region Name
Sud-Munt.	Sud-Muntenia
București	București-Ilfov
Macro P1	Macroregiunea Unu
Macro P4	Macroregiunea Patru
Nord-Est	Nord-Est
Centru	Centru
Vest	Vest
Sud-Vest Oltenia	Sud-Vest Oltenia
Sud-Est	Sud-Est
Nord-Vest	Nord-Vest

Bulgaria

Abbreviation	Full Region Name
Yugozap.	Yugozapaden
Yugoiztoch.	Yugoiztochen
Yugo.&Y.T. BG	Yugozapadna i Yuzhna Tsentralna Bulgaria
Yuzh. Tsentr.	Yuzhen Tsentralen
Sev. & Yug. BG	Severna i Yugoiztochna Bulgaria
Severoiztoch.	Severoiztochen
Severozap.	Severozapaden
Severen Tsentr.	Severen Tsentralen

List of Tables

4.1	Descriptive Statistics for Regional-Level Variables (2014–2020)	39
4.2	Selected Regions by GDP, Employment, and Labor Productivity (2014–2020)	41
4.3	Representative NUTS-2 Regions by GDP, Employment, and Labor Productivity (2014–2020)	43
4.4	Selected NUTS-2 Regions by TFP Indicators and Funding Levels (2014–2020)	45
4.5	Representative NUTS-2 Regions by TFP (HRST and GFCF Methods) and Closeness Score (2014–2020)	47
4.6	Selected NUTS-2 Regions by Funding and Entrepreneurship Indicators (2014–2020)	49
4.7	Representative NUTS-2 Regions by Entrepreneurship Indicators (2014–2020)	51
4.8	Descriptive Statistics for Czechia (2014–2020)	53
4.9	Descriptive Statistics for Bulgaria (2014–2020)	55
4.10	Descriptive Statistics for Romania (2014–2020)	57
5.1	Effect of EU Funding _{t-1} on GDP, Employment, and Labor Productivity . .	63
5.2	Effect of EU Funding _{t-1} on Total Factor Productivity (Two Measures) . . .	65
5.3	Effect of EU Funding _{t-1} on Enterprise Dynamics	68
5.4	Effect of EU Funding _t on GDP and GDP per Capita	70
5.5	Effect of EU Funding _t on International Trade Performance	71
5.6	Effect of EU Funding _t on Inward and Outward FDI Stocks	72
5.7	Effect of EU Funding _t on Employment and Labor Productivity (Country-Level)	74
5.8	Effect of EU Funding on Total Factor Productivity (Capital-Based and HRST-Based)	75
5.9	Effect of EU Funding on Enterprise Dynamics	76



Acknowledgement

I would like to express my heartfelt gratitude to my thesis advisor, Dr. Koray Aktas, for his invaluable support, guidance, and encouragement throughout this research. His insightful advice and academic expertise were fundamental in shaping the direction and quality of my work.

I am also deeply grateful to my family and friends, with special thanks to my boyfriend, Batu, whose unwavering support, love, and belief in me have been a constant source of strength throughout this academic journey.

