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GROWTH METRICS, REGIONAL DEVELOPMENT AND THE OVERLOOKED CONDITIONS OF SOCIETAL SECURITY

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Abstract. *Regional development policy across the European Union continues to rely predominantly on growth-oriented metrics such as GDP, employment rates, investment absorption and productivity indices to evaluate whether regions are progressing. Yet these measures are structurally blind to two conditions fundamental to long-term societal security: social sufficiency floors, meaning minimum acceptable standards of well-being and inclusion, and environmental sustainability ceilings, meaning maximum levels of ecological pressure compatible with stable, liveable communities. This paper argues that this measurement gap constitutes a genuine security vulnerability: one that allows regions to appear successful on paper while social deprivation deepens and environmental conditions deteriorate.*

Drawing on the beyond-GDP economics literature, human and societal security studies, and EU cohesion policy evaluation research, the paper develops three interlocking arguments. First, dominant evaluation frameworks are structurally insensitive to social shortfalls and environmental overshoot: regional well-being measures and GDP diverge systematically at NUTS-2 level, and cohesion policy assessments anchored in growth metrics fail to detect environmentally meaningful progress. Second, these omissions correspond to documented security pathways: persistent regional inequality erodes institutional trust, fuels populist voting and generates political instability, while environmental deterioration creates deferred but compounding insecurity through climate exposure, health burdens and transition risk. Third, a dual-boundary approach that assesses regions against explicit social sufficiency floors and environmental sustainability ceilings as joint necessary conditions offers a principled and practically feasible direction for evaluation reform. This approach adapts the intellectual lineage running from Rockström et al. (2009) and Dearing et al. (2014) through Raworth's Doughnut Economics (2017), translating the insight that the central policy question should be not merely how much growth, but whether societies are operating in a space that is simultaneously sufficient and sustainable, into the EU regional development and cohesion policy context.

These arguments are illustrated at two territorial scales. At the national level, a comparison of Lithuania and the Netherlands demonstrates that GDP convergence and dual-boundary performance are empirically decoupled: Lithuania records strong GDP growth yet fails its social sufficiency floor, while the Netherlands meets social conditions but presses its environmental ceiling. At the urban level, Rotterdam illustrates the same decoupling within a single prosperous city: strong aggregate economic performance coexists with concentrated social deprivation in specific districts and one of Europe's largest sources of industrial greenhouse gas emissions. The main finding is that current metrics systematically reward growth while remaining insensitive to the structural conditions upon which durable regional security depends, and that this failure is detectable at both national and urban scales.

Keywords: *regional development; societal security; beyond-GDP; social sufficiency; EU cohesion policy; dual-boundary approach*

Introduction

In 2022, the European Commission's eighth report on economic, social and territorial cohesion (European Commission 2022) confirmed a familiar pattern: decades of structural fund investment had reduced GDP per capita disparities between EU member states, yet significant regional inequalities persisted, and environmental performance across EU regions remained deeply uneven. The headline finding summarised as convergence in economic output was presented as progress. Yet within many of the converging regions, poverty rates remained high, energy poverty was worsening, institutional trust was declining, and emissions trajectories were incompatible with the EU's own climate commitments. Growth metrics had done their job: they had recorded economic activity. What they had not recorded was whether the conditions for durable, liveable and politically stable regional communities were actually being built.

This paper argues that this is not an incidental measurement failure. It is a structural feature of evaluation systems that were designed to track economic performance and have been extended, by institutional habit and analytical convenience, to serve as proxies for regional development more broadly. GDP per capita, employment rates, investment absorption and productivity indices capture what they were designed to capture: marketed economic activity. They are blind by design to the social sufficiency conditions that determine whether communities can function with dignity and resilience, and to the environmental sustainability conditions that determine whether regional development remains viable over time (Holmes and Widuto 2025). When these blind spots are combined, they create a particular kind of governance failure: one that generates false reassurance about the health of regions that are, in fact, accumulating serious and compounding vulnerabilities.

The security dimension of this failure is the specific focus of this paper. Regional inequality and social deprivation are not merely development problems; they are generators of insecurity in a direct and empirically documented sense. Persistent deprivation erodes institutional trust, fuels distributional grievances and contributes to the political volatility that has reshaped European democratic landscapes over the past decade (Lipps and Schraff 2021; Algan et al. 2017). Environmental deterioration creates its own security pathways: through health burdens, climate exposure, resource stress and the political crises that follow when communities bear the costs of ecological overshoot without warning or support.

These dynamics operate at multiple territorial scales simultaneously. At the national level, Lithuania's rapid GDP convergence has not lifted its population above the social sufficiency threshold: with 25.8 per cent of its population at risk of poverty or social exclusion in 2024, it records one of the highest rates in the EU despite two decades of economic growth (Eurostat 2025a). At the urban level, Rotterdam, one of Europe's most economically significant cities, presents a metropolitan GDP that masks deep internal inequality: Rotterdam-Zuid, home to 200,000 residents, is the most deprived area in the Netherlands (CBS 2024b), while the port complex that generates much of the city's economic identity accounts for approximately 14 per cent of all Dutch CO2 emissions (Port of Rotterdam Authority 2024). A regional evaluation framework that cannot detect these dynamics at either scale is not only analytically incomplete: it is a governance instrument that systematically fails to alert policymakers to the conditions most likely to generate instability, and fails to direct policy resources toward preventing them.

The paper makes a conceptual case for extending existing regional evaluation by adding a dual-boundary dimension: an assessment of regional development against explicit social sufficiency floors, understood as minimum acceptable standards of well-being and inclusion, as well as environmental sustainability ceilings, interpreted as maximum levels of ecological pressure compatible with stable, liveable communities. Drawing on the beyond-GDP

economics literature (Holmes and Widuto 2025), human and societal security studies (Lipps and Schraff 2021) and EU cohesion policy evaluation research (European Commission 2022; Ferrara et al. 2022), it argues that this extension is both conceptually sound and practically necessary. It is conceptually sound because the dual-boundary logic captures the structural conditions for security that growth metrics miss. It is practically necessary because EU policy architecture, which includes cohesion policy, the European Green Deal and the just transition mechanism, already implicitly aspires to these dual conditions, yet lacks the evaluation framework needed to make them measurable and accountable.

The conceptual architecture of the dual-boundary approach developed here draws on three established bodies of scholarship, which it adapts rather than adopts wholesale. The first is the planetary boundaries framework, introduced by Rockström et al. (2009) and subsequently elaborated to identify nine biophysical limits within which human societies can operate sustainably, including climate stability, biodiversity integrity and freshwater use. The second is the social foundations literature, represented most fully by Dearing et al. (2014), who operationalised a set of minimum social thresholds below which human well-being is systematically compromised. Taken together, these two frameworks define a "safe and just operating space": a zone above the social floor and below the environmental ceiling. The third body of scholarship is the synthesis offered by Raworth (2017) in Doughnut Economics, which brought these two frameworks together into a unified evaluative model and, crucially, proposed a fundamental reorientation of the central policy question: not how much economic growth is being generated, but whether societies are operating within this space. This mindset shift, from growth as the objective to the dual-boundary zone as the target, is the specific intellectual contribution this paper applies to the evaluation architecture of EU regional development policy. The analysis adopts the boundary logic and the evaluative reorientation that Raworth articulates, while translating them into the vocabulary of EU regional development assessment, where the goal is not to replace GDP-based analysis but to add the dual-boundary dimension as a necessary complement to it.

The paper proceeds as follows. Section 2 reviews what current regional development metrics measure and what they systematically miss, establishing the empirical case for the measurement gap. Section 3 develops the security argument, showing how the omitted dimensions, social floors and environmental ceilings, correspond to documented pathways from regional deprivation and ecological deterioration to institutional distrust, political instability and societal insecurity. Section 4 sets out the research methodology, explaining the literature review approach and the rationale for the two-level comparative case analysis. Section 5 illustrates the dual-boundary argument at two territorial scales: first through a national-level comparison of Lithuania and the Netherlands, then through an urban-level analysis of Rotterdam, demonstrating that the decoupling between economic metrics and dual-boundary performance is detectable both between countries and within a single prosperous city. Section 6 introduces the dual-boundary evaluation approach, distinguishes it from existing beyond-GDP frameworks, and develops its implications for EU cohesion and just transition governance. Section 7 discusses limitations and the challenges of operationalisation. Section 8 concludes with the core argument restated and a set of concrete policy implications.

What Regional Development Metrics Currently Measure and What They Don’t

Regional development policy in the European Union has long been shaped by a deep institutional logic: structural funds target regions where GDP per capita falls below 75 per cent of the EU average, embedding growth as the foundation of both eligibility and performance

assessment. This architecture was designed to address economic convergence, and it has achieved measurable success on its own terms. But as Widuto (2016) observes, GDP does not account for social and environmental costs, nor does it reflect social and territorial inequalities, a limitation that is structural rather than incidental, rooted in what the indicator was designed to measure rather than what regional policy is intended to achieve.

Standard regional evaluation captures employment rates and investment absorption, but it does not assess whether regions are meeting minimum social conditions: whether poverty is falling below socially tolerable levels, whether households can afford adequate heating, whether access to health services and decent housing is sufficient for communities to function with stability and resilience. These sufficiency dimensions can deteriorate, or remain persistently inadequate, within regions that simultaneously record positive GDP and employment trajectories, a decoupling that the beyond-GDP literature has documented across EU member states over successive programming periods (Holmes and Widuto 2025). The European Social Progress Index (EU-SPI), developed by the European Commission specifically to capture non-economic dimensions of regional development, offers a direct empirical test of this gap. Beltrán-Esteve et al. (2023), analysing the EU-SPI across EU NUTS-2 regions, confirm that the index and GDP per capita are positively correlated but not substitutes: each captures dimensions of regional performance that the other misses, particularly in the domains of basic human needs and individual opportunity. Their analysis provides direct evidence that GDP-based evaluation, however refined, cannot serve as a proxy for the social conditions that regional development policy is ultimately intended to improve.

The measurement gap does not end with the social dimension. An analogous structural blindness applies to the environmental consequences of regional economic activity. Production-based indicators such as territorial GDP and associated emissions inventories measure economic activity at its point of origin but cannot detect the ecological footprint that regional consumption imposes on wider systems. Wilting et al. (2021), constructing subnational consumption-based environmental accounts for EU regions, find that 88 per cent of EU regions import more than half of their total greenhouse gas footprints and 71 per cent import more than half of their land-related biodiversity footprints. Production-based regional metrics therefore substantially understate the environmental responsibility associated with regional economic activity, creating a systematic blind spot in both evaluation and accountability that extends well beyond what territorial GDP can capture.

At the level of policy assessment, the consequences are direct. Albanese et al. (2024), in an influential multidimensional evaluation of the 2007–13 EU Cohesion Policy period, find an overall near-zero effect on environmental outcomes when development is assessed across economic, social, health, education and environmental dimensions simultaneously. This does not mean that cohesion policy failed to generate economic activity; it means that growth-based evaluation frameworks were unable to detect, and therefore unable to incentivise, environmentally meaningful progress. Coscieme et al. (2020), examining GDP across EU-28 countries, confirm the deeper structural relationship: GDP relates inversely to indicators of environmental sustainability, meaning that regions pursuing GDP growth are, on average, moving away from rather than towards the environmental conditions that underpin long-term liveable communities.

This measurement asymmetry has consequences beyond the academic critique of indicator design. When evaluation systems are insensitive to social shortfalls and environmental overshoot, they cannot generate the accountability signals necessary to redirect policy towards preventing those outcomes. Regions can present positive development profiles, including growing GDP, rising employment and high structural fund absorption, while the foundational

conditions that determine their long-term stability and security are eroding. The problem extends below the regional scale. Urban agglomerations present an analogous measurement challenge: city-level aggregate indicators can obscure severe intra-urban disparities in precisely the same way that regional aggregates obscure national-level variation. In municipalities with significant internal economic contrasts, poverty in specific neighbourhoods can become statistically invisible because adjacent prosperous districts inflate the city average, causing deprived communities that would qualify for support on any sufficiency-based assessment to fall below the threshold of policy attention (CBS 2024b; NPRZ 2023). This is not an incidental data artefact; it is the structural consequence of using aggregate metrics for accountability purposes. The argument developed in the following section is that these omissions are not merely suboptimal from a development perspective but constitute genuine security vulnerabilities operating at every territorial scale.

Why This Is a Security Problem, Not Just a Development Problem

The claim that metric blindness in regional policy evaluation constitutes a security problem rather than merely a development shortcoming requires a clear conceptual grounding. Security, in the broad tradition of human security scholarship, extends well beyond the absence of military conflict or criminal violence. Drawing on the foundational contributions of Buzan, Wæver and de Wilde (1998) within the Copenhagen School, societal security refers to the capacity of communities to maintain their essential character, cohesion and functioning under conditions of stress and change. At its core, this requires that basic social conditions are met and that the environmental foundations of liveability are preserved.

The regional scale is a particularly important locus for this analysis. Security outcomes, whether measured in terms of institutional trust, political stability, social cohesion or resilience to economic shocks, are not evenly distributed across national territories. They are shaped powerfully by the specific social and environmental conditions that prevail in particular places. A region that records positive aggregate economic performance while concentrating deprivation in peripheral sub-areas, or that absorbs EU structural funds while its emissions trajectory remains incompatible with climate targets, is not building durable security. The evaluation frameworks that fail to see this are not merely incomplete; they are producing false reassurance about the security foundations of regional communities.

Understood in this light, evaluation frameworks function as early-warning systems, or as substitutes for them. A framework that cannot detect social floor violations or environmental ceiling breaches does not merely fail to warn; it actively reassures, signalling regional health where structural vulnerabilities are accumulating. The distinction between an evaluation architecture that generates early warnings and one that generates false reassurance is, from a security governance perspective, the central distinction that this paper addresses. The following paragraphs document the empirical mechanisms through which this substitution produces measurable and consequential harm.

The pathways through which persistent social deprivation translates into measurable insecurity outcomes are now well-documented empirically. At the most fundamental level, regional inequality erodes the institutional trust that makes governance effective and legitimate. Lipps and Schraff (2021), in a panel study covering 209 NUTS-2 regions across 24 EU member states from 2010 to 2016, find that living in an economically declining, left-behind region carries a direct and sizeable negative effect on trust in EU institutions, operating over and above the effect of individual income or national-level inequality. The regional dimension of

deprivation matters independently: it is not sufficient to track national averages. Regions that fall behind generate trust deficits that national-level social transfers alone cannot repair.
Nordic and Baltic comprehensive security doctrines offer a pertinent parallel. Finnish, Swedish and Estonian security strategy frameworks identify societal resilience as a foundational layer of national defence that requires sustained cultivation across the full fabric of community life rather than improvised mobilisation in moments of crisis (Prime Minister's Office Finland 2017; Swedish Defence Commission 2023). Social sufficiency constitutes, in this doctrine, a security precondition rather than a welfare amenity: the institutional trust, community cohesion and participatory governance that make societies resilient under pressure must already be present when pressure arrives. Where evaluation architecture cannot detect the erosion of these conditions, it contributes to a gap in the early-warning function of European security governance.

The mechanism linking deprivation to institutional distrust is partially mediated by the quality of public institutions themselves. Van de Walle and Migchelbrink (2022) find that process quality, and particularly the perceived absence of corruption, is a more powerful driver of trust in public administration than service output improvements. A one-standard-deviation improvement in perceived absence of corruption raises the odds of trusting public administration by approximately 39 per cent, compared to 22 per cent for equivalent improvements in service outcomes. This finding carries an important implication for regional policy: regions that perform well on growth metrics but poorly on governance quality are likely to experience trust erosion even as their headline development indicators improve. Palmisano and Sacchi (2024), examining EU-28 countries over 2003 to 2019, confirm that rising income inequality significantly reduces trust in national governments, providing a direct longitudinal link between the social shortfalls that growth metrics miss and the institutional legitimacy that regional security requires.

When institutional trust erodes sufficiently, downstream political consequences follow. Algan et al. (2017), exploiting pre-crisis construction exposure as an instrumental variable, demonstrate causally that regional unemployment increases during the Great Recession raised votes for non-mainstream, especially populist, parties while simultaneously lowering trust in national and EU institutions, with virtually no effect on interpersonal trust, indicating that the mechanism is specifically political-institutional rather than general social fragmentation. This is the pathway through which social shortfalls, undetected by GDP-centric evaluation systems, become threats to political stability. Duque Gabriel et al. (2023) demonstrate that austerity consolidations, which effectively breach social floors in affected regions, increase extreme-party vote shares and depress turnout, amplifying political distrust and weakening democratic accountability precisely in the regions most dependent on policy support.

The environmental dimension of insecurity operates through a parallel but distinct set of pathways. Environmental deterioration, whether measured in terms of air quality, ecosystem degradation, resource stress or the trajectory of emissions relative to climate targets, imposes direct costs on regional communities that GDP not only fails to measure but in some cases actively rewards, as established in the previous section (Coscieme et al. 2020). This means that regions pursuing conventional development paths are, in many cases, simultaneously accumulating environmental liabilities that will eventually materialise as costs, to health, to liveability and to productive capacity, that neither their current metrics nor their policy frameworks are designed to anticipate. The European Environment Agency's regional assessments confirm that climate-related risks are unevenly distributed across EU territories, with some regions facing compounding exposure to heat stress, flooding and water scarcity that is entirely absent from standard cohesion policy evaluation criteria.

The security implications of environmental overshoot are most visible in the context of climate-related risks and energy vulnerability. Regions with high dependence on carbon-intensive industries face both transition risk, meaning the economic disruption associated with decarbonisation policies, and physical risk from climate impacts. When evaluation frameworks fail to track environmental trajectory, they cannot identify which regions face the most severe combinations of these risks, and cohesion policy cannot be calibrated to address them. This is not a hypothetical concern: the EU's just transition mechanism was established precisely because the distributional consequences of the green transition were not adequately anticipated by conventional regional evaluation systems. Environmental overshoot generates a particular form of insecurity: one that is diffuse, deferred and largely invisible to growth-oriented metrics until it materialises as acute economic shock or political crisis.

Rodríguez-Pose et al. (2023) provide granular evidence for this territorial differentiation: in small EU regions, each one-percentage-point increase in annual GDP per capita growth is associated with approximately 0.5 percentage points lower far-right vote share, with the political penalty for economic decline being markedly larger in regions with higher immigrant shares. This finding illustrates how the interaction of social deprivation with place-specific demographic conditions amplifies the security consequences of measurement blindness: evaluation frameworks that treat all regions through the same growth lens cannot detect the specific configurations of risk that make some places disproportionately vulnerable. A genuinely security-sensitive evaluation framework must be territorially differentiated, sensitive to the distinct ways that social and environmental conditions are violated in different types of places.

The evidence reviewed in this section establishes a clear and empirically grounded case: the measurement gap described in the previous section is not merely an analytical inconvenience. It corresponds to real and consequential security vulnerabilities, including erosion of institutional trust, political destabilisation, climate exposure and the spatial concentration of disadvantage in places that existing frameworks systematically overlook. These dynamics are detectable at the national scale and within prosperous cities at the neighbourhood scale, as the empirical analysis in Section 5 demonstrates. Section 4 sets out the methodological approach used to investigate them, explaining the rationale for the two-level comparative design and the data sources on which the analysis draws.

Research Methodology

This paper combines two complementary methodological approaches. The first is a systematic conceptual analysis of the academic and policy literature on regional development evaluation, beyond-GDP measurement frameworks, human and societal security studies, and EU cohesion policy assessment. Literature searches were conducted in six thematic rounds using systematic search protocols, covering: EU cohesion policy metrics and their limitations; GDP limitations for regional development evaluation; the relationship between social deprivation and institutional trust; the relationship between regional inequality and political stability; boundary-based measurement frameworks; and beyond-GDP applications to EU regional contexts. Sources were selected for direct relevance to the paper’s conceptual argument, emphasis on EU regional evidence, and quality of empirical grounding. This literature provides the conceptual and empirical backbone of Sections 2 and 3.

The second approach is an illustrative comparative analysis conducted at two territorial scales. At the national level, Lithuania and the Netherlands are compared using publicly available Eurostat and European Environment Agency data. At the urban level, Rotterdam is

analysed as an intra-city case using data from Statistics Netherlands (CBS), the Port of Rotterdam Authority and the National Programme Rotterdam Zuid (NPRZ). This two-level design serves a specific and limited purpose: to demonstrate, with real data, that the measurement gap identified in the conceptual argument is empirically visible at both the country and city scale, and that it produces distinct, policy-relevant failure modes at each. The national case pair was selected deliberately. Both countries have been subject to the same EU cohesion policy and evaluation regime. They represent contrasting positions within the EU development spectrum: Lithuania as a converging lower-income member state, the Netherlands as a high-income institutionally stable economy. They are countries in which the first author has direct biographical and professional familiarity. Crucially, they illustrate two distinct national-level failure modes: one country breaching social floors despite positive GDP trajectories, the other meeting social floors but pressing environmental ceilings. Rotterdam was selected as the urban case because it directly illustrates the intra-city dimension of the argument: as Europe's largest port and a major contributor to Dutch GDP, it performs well by conventional aggregate economic metrics, yet simultaneously concentrates severe social floor violations in Rotterdam-Zuid while hosting an industrial complex responsible for approximately 14 per cent of total Dutch CO_2 emissions. The first author's direct professional and biographical familiarity with Rotterdam, including residence in the city, enables more grounded contextualisation of the data than would otherwise be possible.

Four indicators are used, drawn from the most recent available Eurostat and European Commission data at the time of writing. Social floor indicators are: the at-risk-of-poverty or social exclusion (AROPE) rate, which captures multidimensional poverty and social exclusion and is the primary monitoring indicator under the European Pillar of Social Rights; and the share of the population unable to keep their home adequately warm, which operationalises energy poverty as a specific social sufficiency floor dimension of particular relevance to Northern and Eastern European contexts. Environmental ceiling indicators are: net greenhouse gas emissions per capita (including land use, land-use change and forestry), which measures territorial emissions intensity relative to the EU average and the Paris Agreement trajectory; and the gap between projected 2030 GHG reductions and national climate targets under the EU's Effort Sharing Regulation, which captures the degree of environmental ceiling overshoot on a policy-relevant timescale. GDP per capita in purchasing power standards (PPS, EU average = 100) is included as a reference indicator to contextualise both countries' position under conventional evaluation frameworks.

The comparison is illustrative rather than causal. No claim is made that differences in indicator values are attributable to specific policies or governance choices. The purpose is to demonstrate that growth convergence and boundary-relevant security conditions are empirically decoupled in ways that conventional evaluation frameworks cannot detect, and that the decoupling takes different forms in different regional contexts.

Illustrating the Gap at Two Scales: National and Urban

The dual-boundary argument holds that growth metrics systematically fail to detect two distinct types of regional insecurity: social floor violations where economic convergence has not translated into adequate social conditions, and environmental ceiling pressures where prosperity has been built on an ecologically unsustainable basis. The following analysis illustrates these failure modes at two territorial scales: first at the national level through a comparison of Lithuania and the Netherlands, then at the urban level through an analysis of Rotterdam. Both levels draw on publicly available official statistics and demonstrate the same

core finding: that GDP and related growth metrics present a positive picture while dual-boundary conditions are being violated.

Table 1. Social floor and environmental ceiling indicators: Lithuania and the Netherlands

Indicator	Lithuania	Netherlands	EU average	Source
GDP per capita in PPS (EU27=100), 2024	87	134	100	Eurostat, 2025
At-risk-of-poverty or social exclusion (AROPE, %), 2024	25.8 (p)[1]	15.4	20.2	Eurostat, 2025
Unable to keep home adequately warm (%), 2024	18.0	7.1	9.2	Eurostat, 2025
Net GHG emissions per capita (tCO2-eq, incl. LULUCF), 2024	7.7	8.3	7.6	EC, 2025

Source: Eurostat (2025a/b/c); European Commission Climate Action Progress Report factsheets (2025).

Viewed through a conventional evaluation lens, both countries present as broadly successful cases within the EU framework. Lithuania has achieved remarkable GDP convergence over the past two decades, rising from around 50 per cent of the EU average in PPS terms at the time of accession to approximately 87 per cent by 2024, one of the fastest convergence trajectories in the EU. The Netherlands consistently records GDP per capita well above the EU average, strong institutional quality, low unemployment and high scores on composite well-being indices. By the metrics that EU cohesion policy uses to determine eligibility and assess performance, neither country presents an urgent or unambiguous signal of concern.

The social floor indicators tell a different story for Lithuania (Fig. 1). With 25.8 per cent of the population at risk of poverty or social exclusion in 2024, among the top five highest in the EU, and more than 5 percentage points above the EU average of 20.2 per cent, Lithuania's social floor position has remained deeply problematic throughout its GDP convergence period. Energy poverty is particularly acute: 18.0 per cent of the Lithuanian population reported being unable to keep their home adequately warm in 2024, the third highest rate in the EU and nearly double the EU average of 9.2 per cent. This is not a residual legacy problem on the verge of resolution; it is a structural condition that GDP growth has, in the language of the dual-boundary framework, failed to lift above the social sufficiency floor. The security implications, as established in Section 3, are direct: regions with this depth of social deprivation exhibit elevated institutional distrust, heightened political volatility and the kind of distributional grievance that makes communities disproportionately vulnerable to populist mobilisation.

[1] (p) Provisional value.

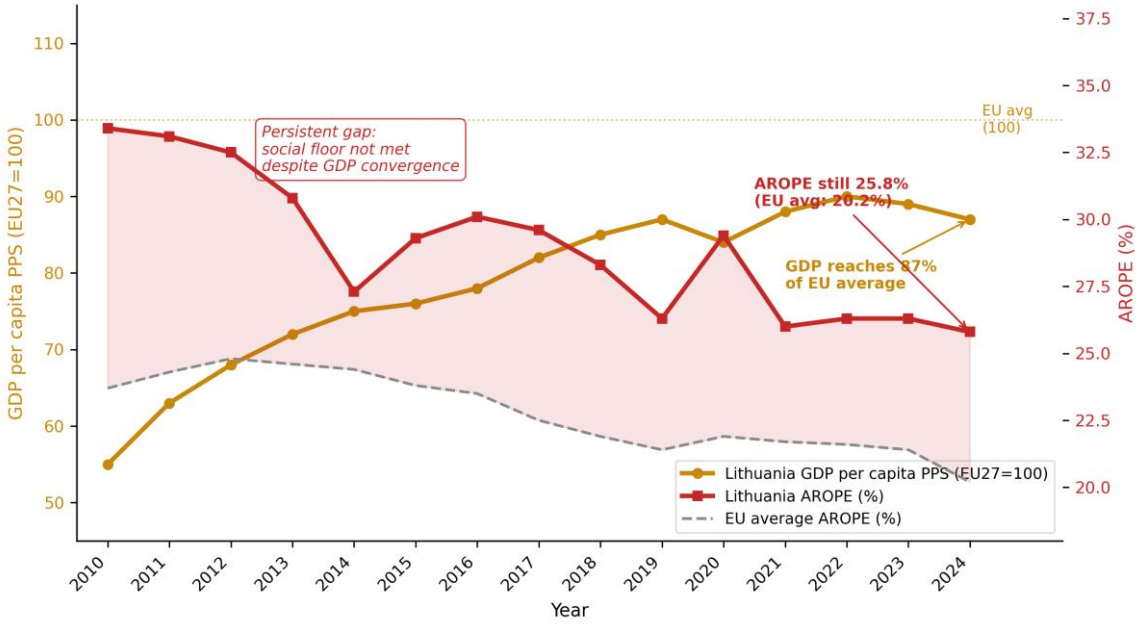


Fig. 1 Lithuania: GDP Convergence and Social Floor Performance, 2010–2024[2]

Source: GDP per capita in PPS: dataset tec00114; Eurostat (2025b) — At-risk-of-poverty or social exclusion (AROPE): dataset ilc_peps01n. 2024 data provisional (p)

The environmental ceiling indicators tell a different story for the Netherlands. With net GHG emissions of 8.3 tonnes of CO2-equivalent per capita in 2024, above the EU average of 7.6 tonnes, and with current policies projected to deliver only a 46 to 52 per cent reduction by 2030 against a statutory target of 55 per cent, the Netherlands faces a significant and acknowledged gap between its emissions trajectory and the environmental ceiling that the Paris Agreement implies. The 10-percentage-point shortfall against its Effort Sharing Regulation target is the largest projected deficit in the comparison pair. This is not primarily a problem of economic stagnation or social deprivation; social floor indicators for the Netherlands are among the best in the EU, but of a high-consumption development model that has not yet been adequately decoupled from its ecological footprint. The security implications are also direct: regions and countries whose emissions trajectories remain incompatible with climate targets are accumulating transition risk, physical climate exposure and the political instability that follows when the costs of inadequate mitigation eventually materialise.

The most significant observation from this comparison is not what the individual indicators show about each country in isolation, but what the comparison itself reveals about the relationship between economic growth and dual-boundary performance. Lithuania's GDP convergence has been real and substantial, yet it has not been sufficient to lift the country above its social sufficiency floor. The Netherlands' economic prosperity has been real and sustained, yet it has not been compatible with staying within its environmental sustainability ceiling. In both cases, GDP per capita, the primary indicator used in EU cohesion policy evaluation, tells an essentially positive story: convergence in Lithuania, high performance in the Netherlands. The dual-boundary indicators tell a more differentiated and, from a security perspective, more accurate story: one country is failing its citizens on basic social conditions; the other is failing

[2] The left axis (amber) shows Lithuania's GDP per capita convergence toward the EU average (EU27=100). The right axis (red) shows the at-risk-of-poverty or social exclusion rate.

its obligations on environmental sustainability. Neither failure is visible from the vantage point of conventional growth metrics.

It should be noted that this comparison operates at the national level, while the full analytical force of the dual-boundary framework is intended for NUTS-2 and NUTS-3 regional analysis. National aggregates conceal significant within-country variation: Lithuania's two statistical regions differ in their social floor conditions, and the Netherlands' twelve provinces differ considerably in their emissions profiles and environmental pressures. The regional-level operationalisation of the dual-boundary framework, using comparable subnational indicators for social floors and environmental ceilings across the full range of EU regions, is the empirical agenda that this illustrative comparison is intended to motivate. The following section establishes the conceptual logic of the framework formally, explains why these specific boundary dimensions were selected, and distinguishes the approach from existing composite well-being indices.

The economic context is worth establishing before examining the failure modes. Zuid-Holland, the province in which Rotterdam is located, is the second largest provincial economy in the Netherlands, contributing 20.6 per cent of Dutch national GDP in 2024 (CBS 2024c). Within this, the Port of Rotterdam alone accounts for approximately 6.2 per cent of Dutch national added value, a figure that rises to double the conventional estimate when the forwards indirect effects, meaning economic activities enabled elsewhere in the Netherlands by the port's presence, are included (Erasmus University Rotterdam / Port of Rotterdam Authority 2018). Rotterdam is not a lagging region seeking convergence; it is a high-value node in one of Europe's most prosperous provincial economies. This makes the following observations considerably more striking.

Rotterdam provides a particularly instructive illustration of how these security dynamics operate within a prosperous urban economy rather than only in peripheral or lagging regions. As Figure 2 illustrates, the city records an employment rate of 68.9 per cent, more than ten percentage points below the Dutch national average of 79.3 per cent, and a poverty rate of 6.2 per cent, the highest of any major Dutch municipality and double the national figure (CBS 2024a; CBS 2024b).

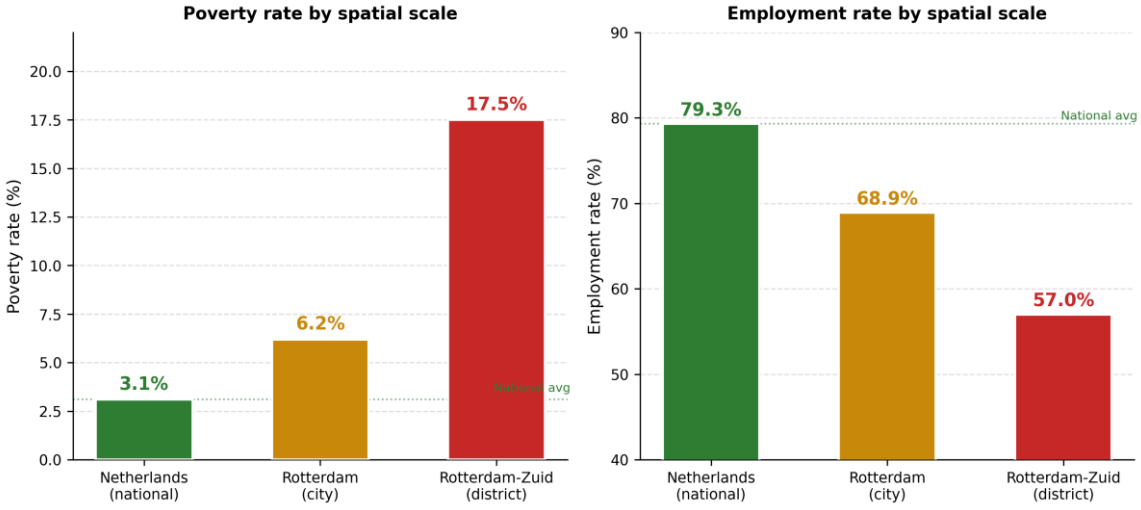


Fig. 2 The Measurement Gap Within a Prosperous City: Rotterdam, 2023
Source: CBS (2024a) Armoede en Sociale Uitsluiting 2023; CBS (2024b) New Method of Measuring Poverty; NPRZ (2023) Uitvoeringsplan NPRZ 2023–2026.

Rotterdam-Zuid, home to approximately 200,000 residents, concentrates approximately 40 per cent of the city's entire welfare caseload despite representing roughly 30 per cent of its population. The National Programme Rotterdam Zuid (NPRZ), a 20-year government intervention running since 2011 with national and municipal co-financing of €260 million in its first decade alone, exists precisely because conventional evaluation frameworks that measure Rotterdam's aggregate economic performance were generating no accountability signal about these conditions (NPRZ 2023). The security implications identified in Section 3, including institutional trust erosion, distributional grievance and political fragmentation, apply in concentrated form to the communities of Rotterdam-Zuid, located at a literal distance from some of the most expensive real estate in the Netherlands. This is not a problem that aggregate growth metrics can detect, and it is therefore not a problem they can motivate policy to prevent.

Toward a Dual-Boundary Approach to Regional Evaluation

The argument developed in the preceding sections points toward a specific evaluative reorientation. If growth metrics are structurally blind to social sufficiency floors and environmental sustainability ceilings, and if this blindness generates security vulnerabilities, then the corrective logic is to build those boundaries explicitly into how regional development is assessed. The dual-boundary approach proposed here does not require abandoning existing evaluation frameworks or replacing GDP as an economic indicator. It requires adding a second evaluative dimension: one that asks not only how much economic activity a region generates, but whether that region is simultaneously meeting minimum social conditions and staying within maximum environmental limits.

The intellectual foundations of this approach rest on three bodies of work introduced in the opening section of this paper, whose combined contribution is more than the sum of their parts. Rockström et al. (2009) established the biophysical science: nine planetary boundaries within which human civilisation can operate sustainably, including climate stability, biodiversity integrity, land system change and freshwater use. Dearing et al. (2014) operationalised the social dimension: minimum thresholds below which human well-being is systematically compromised across twelve dimensions including food, water, health, energy and political voice. These two frameworks together define a safe and just operating space. What they did not provide was an evaluative instrument: a way of using that space as an accountability framework rather than merely as a descriptive or scientific concept.

That is Raworth's specific contribution in Doughnut Economics (2017), and it is the reason this paper treats the Doughnut not simply as one reference among several but as the conceptual pivot of the dual-boundary approach. Raworth's central argument is an evaluative reorientation: the right question for assessing whether economies are working is not how much growth they generate, but whether they are operating within the space defined by the social floor and the environmental ceiling simultaneously. This shifts the accountability question from a continuous ranking, where more is always better, to a threshold question, where the objective is to be inside the zone, not above it. A region that records strong GDP growth while breaching its social floor is not succeeding; it is failing by a criterion that growth metrics cannot see. A region that stays within its environmental ceiling while allowing social conditions to erode is equally failing. It is this conjunctive logic, that both conditions must be met at the same time, that makes the Doughnut framework analytically powerful for security-oriented evaluation. The dual-boundary approach developed here adapts this logic to the regional scale, where both sets of limits take territorially specific forms and where EU policy instruments provide the leverage to act on them.

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Fig. 3 The Dual-Boundary Evaluation Framework: Safe and Just Operating Space for Regional Development

Source: Authors' own elaboration, adapting the conceptual framework of Rockström et al. (2009), Dearing et al. (2014) and Raworth (2017)

Boundary-based thinking offers several practical advantages over both pure GDP evaluation and composite well-being indices when applied to EU regional policy contexts. First, it makes thresholds explicit. Rather than aggregating performance across dimensions into a single score, which can obscure the compensatory dynamics that allow strong performance in one area to mask failure in another, a boundary approach identifies specific conditions that must be met simultaneously. A region that exceeds its environmental ceiling while meeting social floors is not in a safe-and-just zone; neither is a region that maintains environmental sustainability while failing to provide basic social conditions. The distinction matters for policy because the interventions required are fundamentally different.

Second, the boundary logic is well-suited to accountability. Unlike composite indices, where a change in overall score may reflect movement in any of a large number of sub-indicators, boundary conditions are binary in principle: a region either meets a floor or it does not, either stays within a ceiling or it exceeds it. This creates clear accountability signals: regions, national governments and EU institutions can be assessed not just on whether they are improving their headline scores, but on whether they are moving toward or away from a defined zone of sufficiency and sustainability. This maps directly onto the security argument developed in the previous section: security vulnerabilities are created specifically when floors are breached or ceilings are exceeded, not by modest movements within acceptable ranges.

Third, the boundary approach is capable of revealing the trade-offs that growth metrics conceal. A region may simultaneously make progress on social foundations, including reducing poverty, improving health access and expanding educational opportunity, while accelerating environmental overshoot through energy-intensive development. Conversely, a region may maintain strong environmental performance while allowing social floors to erode through austerity or demographic decline. Both configurations represent insecurity of different kinds, and both are invisible to evaluation systems that aggregate performance into a single growth-

oriented score. Making both dimensions explicit allows policy to address the specific failure mode that a given region faces, rather than applying undifferentiated cohesion spending to heterogeneous problems.

It is important to distinguish the dual-boundary approach from the broader family of composite well-being indices and sustainability dashboards that have proliferated in the beyond-GDP literature. Frameworks such as the OECD Better Life Index, the UN Human Development Index, the EU Social Progress Index and the various sustainable well-being indices reviewed in the beyond-GDP literature represent genuine advances over pure GDP evaluation. They are multidimensional, they capture social and environmental dimensions that GDP misses, and their application to EU regional contexts, as demonstrated by Beltrán-Esteve et al. (2023) on the EU Social Progress Index, produces empirically meaningful insights.

The dual-boundary approach differs from these frameworks in three important respects. First, it is explicitly threshold-based rather than continuous. Composite indices rank regions on a scale of relative performance; the boundary approach asks whether absolute conditions are met. This distinction has policy implications: a region that ranks eightieth out of a hundred on a well-being index may still be well above the social floor and within the environmental ceiling; conversely, a region that ranks twentieth may be breaching both. Relative rankings do not tell us what we need to know for security-oriented evaluation. Second, the dual-boundary approach combines social and environmental dimensions as joint necessary conditions rather than additively aggregating them. A region must meet both simultaneously to be considered secure; a high score on one dimension cannot compensate for failure on the other. This is the key structural difference from composite indices, which typically allow trade-offs across dimensions. Third, the boundary approach is explicitly oriented toward policy accountability rather than academic ranking. Its purpose is not to describe which regions are performing better or worse in relative terms, but to identify which regions are failing to meet the structural conditions for long-term security, and to hold policy responsible for addressing those failures.

The EU policy architecture, encompassing cohesion policy, the European Green Deal, the just transition mechanism, the Social Pillar and the emerging sustainable and inclusive well-being agenda, already implicitly aspires to something close to the dual-boundary logic. Cohesion policy seeks to ensure that all regions meet minimum standards of economic and social development. The European Green Deal seeks to ensure that the environmental trajectory of the EU remains within planetary limits. The just transition mechanism seeks to ensure that the green transition does not impose disproportionate social costs on vulnerable regions. What is missing is an evaluation framework that makes these aspirations explicit, measurable and jointly accountable.

The Rotterdam analysis presented in Section 5 illustrates that the dual-boundary framework has direct relevance at the urban scale, not only the regional one. Applying it at city or sub-city level requires indicators available at neighbourhood resolution and a threshold logic that identifies failure modes at that granularity rather than averaging them away. This is technically feasible given the statistical infrastructure already available through CBS Wijken en Buurten and the Port of Rotterdam's emissions monitoring, and is directly relevant to the governance challenges identified by the NPRZ. The present paper establishes the conceptual and security rationale for that empirical agenda at both scales.

Discussion and Limitations

The argument developed in this paper is conceptual and directional in nature. Its value lies in clarifying what a security-sensitive evaluation framework for EU regional development

should measure and why, rather than in providing a fully operationalised methodology ready for immediate application. This scope is deliberate: before measurement systems can be improved, the evaluative logic that should guide them must be clearly articulated. Nevertheless, it is important to acknowledge several limitations and practical challenges that any attempt to implement the dual-boundary approach would need to confront.

The first challenge is data availability. Social and environmental indicators with genuine boundary-relevant content, meaning those that track proximity to sufficiency floors and sustainability ceilings rather than relative performance, are considerably less developed at NUTS-2 and NUTS-3 levels than nationally. Energy poverty data are unavailable for most subnational units. Subnational consumption-based emissions accounts of the kind constructed by Wilting et al. (2021) remain research outputs rather than official statistics. Significant gaps remain, particularly in areas such as granular health outcome data and spatially disaggregated measures of ecosystem pressure. Even for a domain as policy-relevant as population health, data completeness at regional level is uneven and the methodological challenges of cross-country comparability are substantial. These data constraints do not invalidate the dual-boundary approach, but they define the practical boundaries within which any near-term operationalisation must operate.

The second challenge concerns the setting of legitimate thresholds. The dual-boundary approach depends on identifying specific floors and ceilings that can serve as evaluative anchors, but the question of how those thresholds are set, by whom and on what normative basis is non-trivial. Different methodological approaches are available: compliance-based thresholds draw on existing EU and national policy targets, such as the EU poverty reduction goals embedded in the European Pillar of Social Rights or the emissions trajectories implied by the Paris Agreement; sufficiency-based thresholds draw on evidence about minimum conditions for human functioning and well-being; science-based thresholds draw on biophysical research on ecological limits. Each approach has different implications for the stringency, comparability and political acceptability of the resulting framework. The risk of technocratic capture, meaning threshold-setting that becomes an expert exercise disconnected from democratic deliberation about what regional communities actually need and value, is real and must be acknowledged. A robust implementation of the dual-boundary approach would require transparent, participatory and contestable processes for threshold-setting, not merely technical optimisation.

The third challenge is the attribution problem. Even where regional performance relative to social floors and environmental ceilings can be reliably measured, attributing observed outcomes to specific policy interventions is methodologically demanding. EU cohesion policy is delivered alongside a complex mix of national, regional and local instruments, and the causal contribution of any single policy stream to observed changes in social or environmental conditions is difficult to isolate. This is not a problem unique to the dual-boundary approach; it applies equally to GDP-based evaluation, but it is worth stating clearly that boundary-based assessment tells us whether regions are moving in the right direction, not necessarily why. Distinguishing the contribution of policy from structural factors, global trends and place-specific characteristics requires rigorous counterfactual evaluation design, and that frontier would need to be extended to social and environmental boundary indicators. The Rotterdam analysis introduced in this paper further illustrates a fourth challenge that the national-level comparison does not raise: the sub-city spatial resolution problem. Rotterdam-Zuid's social floor failure is not visible from Rotterdam's aggregate statistics, just as Rotterdam's aggregate statistics are not visible from Dutch national statistics. Applying the dual-boundary framework meaningfully at urban scale therefore requires neighbourhood-level data availability that varies considerably across EU member states and is not systematically produced for policy purposes

in most countries. This is a specific data infrastructure challenge that must be acknowledged alongside the more general data availability issues discussed above.

A fifth consideration stands apart from the preceding technical challenges, addressing instead a question of conceptual framing. Describing metric gaps as security vulnerabilities, as this paper does, is a deliberate rhetorical and conceptual choice that carries risks alongside its advantages. The security framing is intended to elevate the urgency of evaluation reform by connecting it to an audience and a policy community, namely public security governance, that is not typically engaged in debates about regional development metrics. This is a genuine contribution: the security literature has much to learn from the regional development and beyond-GDP fields, and vice versa. But the securitisation of development challenges also carries the risk of justifying disproportionate or coercive responses, or of framing what are fundamentally distributional and political questions as technical-security problems amenable to expert solutions. The argument here is that evaluation frameworks should be made more sensitive to the conditions that generate insecurity, not that security imperatives should override democratic processes of priority-setting or regional self-determination.

These limitations do not undermine the central argument of the paper. They define the work that remains to be done. The conceptual case for extending regional evaluation toward a dual-boundary logic is strong, grounded in a substantial empirical literature, and responsive to genuine governance failures in the current system. The practical challenges of operationalisation, threshold-setting and attribution are real but tractable, and they are the appropriate focus of the empirical research agenda that this conceptual paper is intended to motivate.

Conclusions

This paper has developed a conceptual argument with three interlocking claims. First, that the dominant metrics used to evaluate EU regional development, including GDP, employment rates, investment absorption and related growth-oriented indicators, are structurally blind to two conditions that are fundamental to long-term regional viability: social sufficiency floors and environmental sustainability ceilings. This is not a minor technical shortcoming. It is a systematic bias built into the evaluation architecture of EU cohesion policy, one that allows regions to record positive headline performance while social deprivation deepens and ecological pressures accumulate.

Second, that this measurement gap is not merely a development problem but a security problem. The empirical literature on EU regional dynamics is unambiguous: persistent inequality and social deprivation erode institutional trust, generate political instability, and fuel the kind of distributional grievances that manifest in populist voting, disengagement from democratic institutions and loss of legitimacy for the European integration project itself. Environmental deterioration creates its own security pathways: through climate exposure, health burdens, transition risk and the political crises that follow when communities bear the costs of decarbonisation without adequate support. Evaluation frameworks that cannot see these dynamics cannot generate the accountability signals needed to address them.

Third, that a dual-boundary approach, building on the intellectual lineage from Rockström et al. (2009) and Dearing et al. (2014) through Raworth (2017) established in the Introduction, contributes the translation of that evaluative insight into the specific context of EU regional development assessment and funding allocation. It demonstrates that the dual-boundary logic can be applied at national and urban scales, that it reveals failure modes invisible to GDP-centric evaluation, and that it aligns with governance ambitions already embedded in

EU cohesion policy, the European Green Deal and the just transition mechanism. The question of which indicators should operationalise floors and ceilings at regional and sub-city scales remains open; it is the primary task for the empirical research agenda this paper motivates.

The illustrative comparison of Lithuania and the Netherlands, presented in Section 5, confirms that this decoupling is not a theoretical abstraction but an empirically visible and policy-relevant reality. In Lithuania, strong GDP convergence coexists with one of the highest poverty and social exclusion rates in the EU and acute energy poverty. In the Netherlands, high prosperity coexists with greenhouse gas emissions above the EU average and a projected ten-percentage-point shortfall against its 2030 climate target. Both cases illustrate why evaluation reform requires a framework capable of detecting both failure modes simultaneously, and why no single composite score can substitute for the explicit, joint assessment of social and environmental boundary conditions.

Operationalising a dual-boundary framework for EU regional policy, including selecting indicators, setting defensible thresholds, developing comparative assessment tools and building the data infrastructure needed to support rigorous evaluation, requires empirical work that goes well beyond what a conceptual argument can deliver. That work is the appropriate next step in a research agenda that takes seriously the proposition that regional development policy should be accountable not only for generating growth, but for building the durable social and environmental foundations on which genuine and lasting regional security depends.

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