# Talent in Transit: Understanding Brain Drain in the Balkan EU Research Systems

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**Abstract**

This article explores the dynamics of brain drain in the research systems of four Balkan EU countries (Romania, Bulgaria, Greece, and Croatia) through a qualitative evidence synthesis of academic and institutional literature published between 2012 and 2024. The study examines the main factors for brain drain and skilled immigration, consequences, and the proper policy responses to the emigration of highly skilled professionals, with a focus on the sectors of research and innovation.

The article's analysis was based on a meta-synthesis of 33 relevant sources, including 26 peer-reviewed articles, 3 non-indexed publications, and 4 international reports. The evidence has been categorized, by theme, into push and pull factors, economic impact, brain drain consequences for national research systems, and public policy interventions. A dedicated section is also included, which examines the role of EU funding instruments and structural funds in shaping institutional capacity and influencing talent retention.

Shared structural challenges have been identified across the region, including underfunding, limited career options, and weak reintegration mechanisms for returning researchers. Despite access to EU funding, national systems often lack the governance and strategic alignment required to convert EU financing into effective talent retention policies, while the concept of brain circulation is remaining more aspirational than operational in most contexts.

The article tries to create literature novelty by offering a cross-country comparative analysis of skilled migration within the EU's southeastern periphery and by highlighting the disconnect between EU-level program logic and domestic realities. It provides insights relevant for policy actors at both national and European levels. Recommendations include the integration of talent strategies into research governance reforms and more coherent engagement with academic diasporas.

**Keywords**

Brain Drain, Research Systems, Balkan EU Countries, Talent Retention, EU Funding, Push–Pull Factors, Skilled Migration.

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## Introduction

Brain drain, meaning the emigration of highly skilled individuals (e.g., Ganga et al., 2016), has remained a persistent challenge for several European Union (EU) member states, including Central and Eastern Europe generally (Batog et al., 2019), and with some prominence in the Balkan EU member states. Despite targeted investment policies being applied in the region for over a decade, countries such as Romania, Bulgaria, Greece, and Croatia continue to experience significant outflows of human capital, especially in the research and innovation sectors. These trends are shaped by a complex relationship of structural push factors (e.g., Krammer, 2017; Gherhes et al., 2020) throughout the Balkan region, attractive pull dynamics from Western Europe, and limited capacity to retain or reintegrate talent.

While the phenomenon of brain drain has been widely acknowledged across Europe (Ganga et al., 2016; Batog et al., 2019) and the entire globe, with various policy responses proposed, such as the role of education subsidies (Shimada, 2019), there are limited comparative analyses that focus specifically on the European Union Balkan states. Moreover, the role of EU funding in shaping research ecosystems and its potential to counteract brain drain has yet to be critically examined in an integrated framework.

This article addresses this gap by conducting a qualitative evidence synthesis (QES) of 33 relevant sources published between 2012 and 2024. It explores the drivers and effects of brain drain across four EU member states in the Balkan region, with a particular focus on the research sector. The study also reviews the effect of the EU funding instruments on national research systems and their role in alleviating talent drain.

## 1. Literature review

The emigration of highly skilled individuals, commonly referred to as "brain drain," is a persistent global phenomenon with significant implications for both sending and receiving nations (Ganga et al., 2016; Batog et al., 2019). This review will outline the conceptual understanding of brain drain, explore its key drivers and consequences, discuss common policy approaches to its mitigation, and specifically examine the intended role of European Union (EU) funding mechanisms in addressing research capacity and talent mobility, thereby setting the context for the subsequent analysis of the Balkan EU states.

### 1.1. Defining Brain Drain and Skilled Migration

Brain drain typically indicates an outflow of human capital, particularly individuals with tertiary education or specialized skills, from one country or region to another. While often viewed negatively by sending countries due to the loss of potential innovators and contributors to national development, the concept of "brain circulation" is also a concept that is being discussed, suggesting a more dynamic and potentially beneficial two-way or multi-nodal flow of talent (Boc, 2020). Skilled migration, therefore, encompasses not just permanent relocation but also various forms of mobility, including student exchanges and temporary research stays, which can sometimes be precursors to longer-term emigration if domestic conditions are unfavorable (Ganga et al., 2016).

### 1.2. Key Drivers of Brain Drain: Push and Pull Factors

The decision for skilled individuals to emigrate is typically driven by a complex interplay of "push" factors in their home country and "pull" factors in destination countries. Push factors often include limited economic opportunities, low salaries, inadequate research infrastructure and funding, lack of meritocracy, political instability, and poor governance (Hinks and Davies, 2015; Oldac, 2023). Conversely, pull factors comprise higher remuneration, better career advancement prospects, access to advanced research facilities and networks, more stable political and economic environments, and a higher quality of life in destination countries.

### 1.3. Impacts of Brain Drain on Sending Countries

The consequences of brain drain for sending countries are multifaceted. Economically, it can lead to shortages of qualified personnel in critical sectors, a reduced return on national investment in education, and a dampened capacity for innovation and competitiveness. For research systems, the departure of scientists and academics can result in diminished research output, fewer scientific publications and patents, and weakened international collaborations. While remittances from emigrants can provide some economic benefits, they often do not fully compensate for the loss of human capital and its broader developmental impact.

### 1.4. Policy Approaches to Mitigating Brain Drain

Governments and institutions have adopted various strategies to mitigate brain drain. These broadly include efforts to improve domestic economic and professional opportunities (retention strategies), incentives for emigrants to return (return strategies), and initiatives to engage with the diaspora to leverage their skills and networks for national development even from abroad. Addressing systemic issues such as governance, corruption, and the quality of research and educational institutions are also considered crucial components of comprehensive brain drain mitigation policies (Shimada, 2019).

### 1.5. The Role of European Union Funding in Research, Innovation, and Mobility

The European Union utilizes a range of funding mechanisms to bolster national research systems, intending to foster cohesion and diminish inter-regional inequalities across Europe, which indirectly addresses factors contributing to research brain drain (Arcalean et al., 2012; Boc, 2020).

Key instruments like the Structural Funds (including ERDF and ESF) and the Cohesion Fund aim to reduce economic and social imbalances that often push researchers to emigrate (Arcalean et al., 2012). By investing in infrastructure, education, and employment opportunities in less developed regions, these funds theoretically aim to create more attractive domestic environments.

Horizon Europe, the EU's flagship research and innovation program, supports cutting-edge research (including AI), enhances educational investment, and potentially diminishes brain drain through strategic implementation (Khan, 2021). Mobility programs like Erasmus+ primarily focus on education but can influence researcher mobility, ideally fostering "brain circulation" (Boc, 2020).

Furthermore, EU strategies like the Digital Single Market and the European Strategy for AI seek to create an attractive internal market for talent (Socol and Iuga, 2024). Specific instruments like the Policy Support Facility (PSF) directly assist Member States in reforming their RandI systems, while National Recovery and Resilience Plans (RRPs) allow countries to target reforms and investments to counteract brain drain (Commission, 2023). Cooperation programs like URBACT, Interreg, Europe for Citizen, and the Alpine Space Program also provide avenues for local and regional authorities to collaborate on tackling brain drain challenges (Boc, 2020).

Collectively, these funds aim to create attractive domestic opportunities, promote research excellence, facilitate knowledge exchange, reduce regional disparities, and enhance the quality of research institutions across the EU (Commission, 2023; Socol and Iuga, 2024). However, the effective translation of these broad EU-level objectives into tangible brain drain mitigation at the national level, particularly within the specific context of the Balkan EU states, remains a complex issue warranting further investigation. This study seeks to explore this interface by examining the perceived drivers, impacts, and policy responses to brain drain in selected Balkan EU countries, including the role of EU funding.

## 2. Methodology

This article is based on a qualitative evidence synthesis (QES), drawing from a diverse body of literature to examine the patterns, drivers, and policy responses to brain drain across selected Balkan EU member states. The approach follows the logic of a meta-synthesis, combining empirical insights from multiple sources to produce an integrative, thematically structured analysis.

A total of 33 documents were included in the synthesis. Of these, 26 were peer-reviewed journal articles indexed in Scopus, 3 were non-indexed articles, and 4 were policy or institutional reports published by international organizations. The majority of sources were published between 2015 and 2024, with three earlier publications (from 2012 and 2014) having been retained due to the relevance of their findings during that period of time. These older sources, however, were not central to the formulation of conclusions and were treated mostly as background references.

The analysis focused on four EU countries in the Balkan region: Romania (11 articles), Greece (5 articles), Croatia (2 articles), and Bulgaria (3 articles). In addition, 8 comparative EU-wide studies and 4 international reports were included to provide broader contextual insights into the brain drain phenomenon and related mobility trends.

Articles were selected based on their relevance to the concept of brain drain, with a preference for those addressing brain drain explicitly in the areas of research or areas that involve research or innovation. In countries or sectors where targeted literature was limited, studies addressing broader forms of skilled or educational migration were also considered, particularly when they offered insights into drivers, impact, or institutional responses relevant to brain drain dynamics.

All documents were fully analyzed and coded into a structured table, which recorded key metadata such as the focus on a particular country (Romania, Greece, Bulgaria and Croatia), publication year, methodology used and policy relevance. Thematic coding was applied to identify recurring patterns under the categories of push factors, pull factors, economic impact, impact on research, and policy responses. These codes were then used to organize the analysis presented in Sections 3 and 4.

The analysis excludes non-EU Balkan countries, as well as grey literature not produced by respectable international organizations. Moreover, due to limited access to official statistical data on brain drain, no statistical or econometric analysis was conducted. The main focus of the article is on qualitative interpretation, with comparative and policy-oriented insights drawn from existing academic and institutional literature.

## 3. Results and Discussion

Overall, the synthesis of the selected literature reveals a complex and multilayered picture of brain drain in the Balkan EU countries. While national contexts vary in intensity and policy response, several recurrent themes emerge across Romania, Bulgaria, Greece, and Croatia. The analysis is structured around five key dimensions: structural push factors, external pull incentives, economic consequences, the impact on national research systems, and policy responses aimed at mitigating talent loss. These thematic categories reflect both the scale and the depth of challenges faced by the region, and provide a comparative foundation for interpreting the broader implications of skilled migration in the targeted region.

### 3.1. Push Factors – Comparative Insights

Economic dissatisfaction serves as a primary push factor across all four Balkan nations. In Romania, unsatisfying salary levels are a major driver (Gherhes et al., 2020; Iacob (Bâra), 2018), compounded by broader economic instability (Iacob (Bâra), 2018). Greece faces similar issues with low salaries (Panagiotakopoulos, 2020) stemming from the severe crisis aftermath (Kousis et al., 2022). Limited or unsuitable employment opportunities plague Romania (Gherhes et al., 2020), and Greece, where there's low demand for skilled labor (Labrianidis et al., 2022b). Bulgaria's challenges stem from its difficult economic transition (Georgiev and Ohtaki, 2016), while Croatia experiences lack of employment especially post-recession and EU entry (Pintarić and Župarić-Iljić, 2024). Professionally, limited career advancement prospects push individuals from Romania (Iacob (Bâra), 2018), Greece (Labrianidis et al., 2022a; Panagiotakopoulos, 2020), and Croatia (Tomić and Taylor, 2018). Furthermore, poor working conditions, including lack of equipment in Romania (Petroff, 2016), problematic business culture and lack of job security in Greece (Panagiotakopoulos, 2020), discouraging environments in Romania (Botezat and Moraru, 2020), and limited collaboration opportunities in Bulgaria (Krammer, 2017), all contribute to the decision to emigrate.

Beyond economic and professional concerns, deep-seated socio-political issues fuel brain drain. High levels of corruption and a lack of meritocracy are significant push factors in Romania (Iacob (Bâra), 2018 - implicit link), Greece (Panagiotakopoulos, 2020), and Croatia (Pintarić and Župarić-Iljić, 2024). Political and legislative instability adds to the uncertainty in Romania (Iacob (Bâra), 2018) and characterized Bulgaria's post-communist years (Georgiev and Ohtaki, 2016). Greece uniquely highlights a crisis of social values and lack of trust in institutions (Kousis et al., 2022; Panagiotakopoulos, 2020), while Croatia reports a generally negative societal climate and sense of hopelessness (Pintarić and Župarić-Iljić, 2024). Deficiencies in public services, such as the poor status of the healthcare system in Romania (Giurgiuca et al., 2018) or lack of state support for welfare in Greece (Panagiotakopoulos, 2020), also drive emigration. Finally, issues within the education systems, including perceived low quality or haphazard reforms in Bulgaria (Georgiev and Ohtaki, 2016) and a mismatch with labor market needs in Croatia (Pintarić and Župarić-Iljić, 2024), act as further push factors for skilled individuals.

The decision to emigrate from these Balkan countries stems from multiple identified factors. While inadequate economic rewards and limited job opportunities provide a strong initial impetus, deep dissatisfaction with the socio-political landscape, which is marked by corruption, instability, and institutional mistrust, along with constrained professional development and concerns about the quality of public services and education, solidify the push towards seeking opportunities elsewhere.

### 3.2. Pull Factors – Opportunities Abroad and the Lure of Excellence

Destination countries exert a strong pull primarily through superior economic and professional prospects. The allure of significantly higher income, greater financial security, and an improved standard of living is a major motivator for emigrants from Romania (Apostu et al., 2022; Giurgiuca et al., 2018), Greece (Labrianidis et al., 2022b; Kousis et al., 2022; Panagiotakopoulos, 2020), and Croatia (Pintarić and Župarić-Iljić, 2024), as well as Bulgaria, where individuals seek better economic opportunities (derived from Georgiev and Ohtaki, 2016). Equally important are enhanced career opportunities, including better chances for professional advancement, access to further training and development, and international recognition; these factors are highlighted for Romania (Gherhes et al., 2020; Giurgiuca et al., 2018; Iacob (Bâra), 2018), Greece (Labrianidis et al., 2022b; Kousis et al., 2022), Croatia (Pintarić and Župarić-Iljić, 2024), and Bulgaria, where better professional development and research facilities are sought (derived from Georgiev and Ohtaki, 2016; Krammer, 2017). For many, particularly in Greece, the availability of more interesting, fulfilling jobs that match their specialization and offer greater job satisfaction is a key attraction (Labrianidis et al., 2022b; Panagiotakopoulos, 2020).

Beyond financial and career incentives, the appeal of destination countries lies in better overall living and working environments. Superior working conditions, better facilities, and access to advanced technology,

especially noted for Romania (Giurgiuca et al., 2018; Séchet and Vasilcu, 2015; Gherhes et al., 2020) and Croatia (Pintarić and Župarić-Iljić, 2024), draw professionals seeking more effective and satisfying work experiences. High-quality educational programs and research opportunities attract students and academics from Romania (Flanja and Nistor (Gâz), 2017) and Croatia (Pintarić and Župarić-Iljić, 2024), while better training is a pull for Greece (Kousis et al., 2022) and Bulgaria, where higher quality education is desired (derived from Georgiev and Ohtaki, 2016). Furthermore, perceived political and economic stability attracts emigrants from Romania (Mitrică et al., 2022), Greece (Panagiotakopoulos, 2020), and Bulgaria (derived from Georgiev and Ohtaki, 2016). More meritocratic systems appeal to those leaving Romania (Iacob (Bâra), 2018 - inferred from push), Greece (Panagiotakopoulos, 2020), and Croatia (Pintarić and Župarić-Iljić, 2024). Better social welfare in Greece (Panagiotakopoulos, 2020) and an overall higher quality of life in Romania (Flanja and Nistor (Gâz), 2017), Greece (Panagiotakopoulos, 2020), and Croatia (Pintarić and Župarić-Iljić, 2024) are significant attractions. Facilitated mobility within the EU, particularly noted for Croatia (Pintarić and Župarić-Iljić, 2024), further lowers the barrier to emigration.

Ultimately, foreign destinations present a compelling package for many skilled individuals from these Balkan nations. They offer not just solutions to the economic and professional frustrations experienced at home, but also the promise of a more stable, rewarding, and opportunity-rich environment for personal and professional growth.

### 3.3. The Impact of Brain Drain on Balkan EU Research and Economic Systems: QES Findings and Discussion

The emigration of highly skilled individuals represents a significant economic blow to Romania, Greece, Bulgaria, and Croatia, primarily through the substantial loss of valuable human capital (Iacob (Bâra), 2018; Kousis et al., 2022; Georgiev and Ohtaki, 2016; Pintarić and Župarić-Iljić, 2024). This depletion manifests as shortages of qualified personnel in crucial sectors, notably healthcare in Romania (Botezat and Moraru, 2020) and Croatia (Pintarić and Župarić-Iljić, 2024), but also impacting IT, construction, and education in Romania (Gherhes et al., 2020). A consistent consequence across the region is the negative impact on innovation capacity and national competitiveness. Greece experiences reduced scientific citations and patent applications following skilled emigration (Labrianidis et al., 2023), while Bulgaria suffers from weak innovation performance, stalled competitiveness, and low-sophistication exports due to the loss of talent (Krammer, 2017). Similarly, Romania's innovation potential is hindered by the departure of STEM graduates and inventors (Gherhes et al., 2020; Mitrică et al., 2022), and Croatia views the outflow as a threat to its overall competitiveness and potential for productivity gains (Tomić and Taylor, 2018).

Broader economic development is also hindered by brain drain. The loss constitutes a poor return on national investment in education, as the benefits are realized elsewhere, a point noted for Romania (Iacob (Bâra), 2018) and Croatia (Pintarić and Župarić-Iljić, 2024). This outflow can potentially dampen economic growth and slow income convergence with more advanced economies, as suggested for Romania (Iacob (Bâra), 2018), and reduces Greece's potential for economic recovery (Kousis et al., 2022). Furthermore, emigration contributes to negative demographic trends that strain social systems like pensions and healthcare financing, a concern highlighted in Croatia (Tomić and Taylor, 2018), and can exacerbate regional socio-economic disparities within countries like Romania (Mitrică et al., 2022) and potentially Bulgaria (Krammer, 2017). While remittances from emigrants provide some financial inflow, they are often seen as insufficient to compensate for the multifaceted economic damage caused by the loss of skilled individuals, as noted in Romania (Iacob (Bâra), 2018) and Croatia (Tomić and Taylor, 2018). Romania also notes the potential for positive contributions via diaspora networks and brain circulation (Mitrică et al., 2022; Petroff, 2016).

The research sectors in Romania, Greece, Bulgaria, and Croatia are significantly weakened by the emigration of highly skilled individuals, leading to a direct loss of researchers, scientists, and academics (Iacob (Bâra), 2018; Vasile, 2012; Labrianidis et al., 2023; Georgiev and Ohtaki, 2016; Tomić and Taylor, 2018). This depletion of human capital translates directly into diminished research capacity and output. Specific impacts include reduced scientific citations and patent applications in Greece (Labrianidis et al., 2023), limited research volume and slower scientific advancement in Romania (Drumea and Mirela, 2015), and a decline in global publication share, dimming scientific impact, and weak patenting in Bulgaria (Krammer, 2017). Croatia also faces reduced research output and innovation potential due to the outflow of its tertiary-educated youth (Tomić and Taylor, 2018). The loss is acutely felt, described as losing valuable "knowledge procreators" in Greece (Labrianidis et al., 2023) and resulting in a scarcity of qualified professionals in Bulgaria (Georgiev and Ohtaki, 2016).

Beyond the direct loss of personnel and output, brain drain causes broader systemic damage to the research environment. It leads to an underutilization of national investments in higher education, as skilled graduates

leave Romania (Iacob (Bâra), 2018), and weakens crucial linkages between research institutions and industry in Bulgaria (Krammer, 2017). The emigration hinders the adoption of new research technologies and practices in Bulgaria (Georgiev and Ohtaki, 2016) and poses challenges for establishing robust international collaborations in Croatia (Tomić and Taylor, 2018). Furthermore, the lack of adequate funding, technology, and attractive career paths within domestic research institutions often acts as a push factor in Romania, exacerbating the problem (Petroff, 2016), while the brain drain itself can negatively impact the education system that trains future researchers in Bulgaria (Georgiev and Ohtaki, 2016). Although mitigation efforts exist, such as Croatia's diaspora engagement programs, their long-term effectiveness remains unclear (Tomić and Taylor, 2018).

Consequently, brain drain imposes a significant economic burden on these Balkan nations, while being a major impediment to scientific and technological advancement in these Balkan nations. It erodes the human capital base, weakens key sectors, stifles innovation and competitiveness, and hinders long-term development prospects. By draining the pool of qualified researchers and weakening the research infrastructure, it fundamentally undermines the countries' capacity for innovation and their ability to compete in a knowledge-based global economy.

### 3.4. Policies and Good Practices QES and Discussion – Addressing Brain in the Balkans

A common thrust in policy recommendations across the four Balkan nations involves strengthening domestic economic and professional opportunities to reduce emigration incentives. This includes significantly increasing wages, especially for skilled professionals in Romania (Botezat and Moraru, 2020; Gherhes et al., 2020; Giurgiuca et al., 2018), providing targeted financial incentives like tax breaks or scholarships in Greece (Kousis et al., 2022; Labrianidis et al., 2022b, 2023) and Bulgaria (Krammer, 2017), ensuring economic stability in Romania (Iacob (Bâra), 2018), and actively creating high-quality job opportunities aligned with graduate skills, particularly in RandD and high-tech sectors in Romania (Gherhes et al., 2020; Mitrică et al., 2022) and Greece (Kousis et al., 2022). Enhancing career development prospects in Romania (Gherhes et al., 2020; Iacob (Bâra), 2018) and improving the overall work environment there (Botezat and Moraru, 2020; Iacob (Bâra), 2018) are also key. Reforming education systems is critical, focusing on improving quality in Romania (Mitrică et al., 2022), better alignment with labor market needs through practice-based approaches in Croatia (Tomić and Taylor, 2018) and Bulgaria (Krammer, 2017), and developing specific skills training in Bulgaria (Krammer, 2017).

Beyond economic measures, addressing systemic socio-political issues and fostering innovation are crucial. Aggressively tackling corruption is recommended for Romania (Botezat and Moraru, 2020; Iacob (Bâra), 2018) and Greece (Kousis et al., 2022). Ensuring political stability in Romania (Iacob (Bâra), 2018) and improving public administration and services like healthcare in Romania (Apostu et al., 2022; Botezat and Moraru, 2020; Giurgiuca et al., 2018; Séchet and Vasilcu, 2015) and Greece (Kousis et al., 2022) are also advised. Investing significantly in RandD, modernizing research infrastructure, and creating attractive career paths for researchers are vital for retaining talent in science and technology in Romania (Mitrică et al., 2022; Apostu et al., 2022) and Bulgaria (Krammer, 2017). Engaging the diaspora is a shared strategy, ranging from implementing targeted return migration programs in Romania (Mitrică et al., 2022; Petroff, 2016) and Croatia (Tomić and Taylor, 2018) to Greece's pragmatic focus on leveraging expatriate potential through "virtual return" networks and collaborations (Kousis et al., 2022; Labrianidis et al., 2022b, 2023). Such policies must also consider the agential perspective of migrants, where return does not automatically equate to contribution, and home country dynamics play a significant role in their willingness to engage (Oldac, 2023). Furthermore, specific educational policies, such as carefully designed subsidies, could potentially mitigate the initial student migration that often precedes permanent skilled emigration (Shimada, 2019). Supporting entrepreneurship in Bulgaria (Krammer, 2017) and improving overall quality of life in Romania (Botezat and Moraru, 2020; Iacob (Bâra), 2018) are also seen as important retention factors.

Across analyzed literature the need for comprehensive, integrated national strategies is highlighted. Effectively countering brain drain requires simultaneous action on multiple fronts—economic, political, educational, and social—to address the root causes of emigration while building a more attractive and rewarding environment for skilled professionals to remain or return.

### 3.5. The Role and Challenges of EU Funding in Mitigating Balkan EU Brain Drain: QES Findings and Discussion

Despite significant EU investment, several structural barriers impede the effective absorption and impact of funds aimed at mitigating research brain drain. A lack of sufficient coordination across local, regional, national, and EU governance levels can lead to fragmented efforts and hinder coherent policy implementation (Boc, 2020). Weak institutional capacity, excessive bureaucracy, lack of transparency, and poor governance within recipient regions or nations represent major obstacles, as effective fund

management is crucial for success; indeed, poor governance can itself be a push factor for emigration (Boc, 2020; Commission, 2023). Persistent socio-economic disparities and inequalities across Europe, potentially leading to a "two-speed Europe," fundamentally drive brain drain, and if EU funds fail to substantially reduce these gaps, their impact on retention will be limited (Boc, 2020). Furthermore, the structural characteristics of regional economies, such as high agricultural employment, can limit their capacity to absorb knowledge spillovers generated by EU investments (Arcalean et al., 2012). Policies may also fail if they do not adequately understand and address the specific needs and expectations of the researchers they aim to retain (Boc, 2020). Attracting and retaining talent also requires addressing broader structural impediments beyond employment, such as quality of life factors, access to services, and cultural integration support (Boc, 2020). In some contexts, shortcomings in national research policies, political interference, cultural factors like paternalism, and a lack of meritocratic processes like peer review in funding allocation can undermine the effectiveness of EU funds (Marino and Cirillo, 2014). Finally, the transferability of successful best practices between regions can be limited by differing local competencies, national regulations, and resource availability (Boc, 2020).

A significant challenge arises from the disconnect between the logic underpinning EU funding mechanisms and the diverse realities within individual member states. While the EU pursues broad objectives like cohesion and competitiveness, national governments often grapple with distinct priorities, short-term pressures, and unique structural challenges that may not align perfectly with the EU's long-term vision or specific funding criteria (Marino and Cirillo, 2014; Khan, 2021). The inherent heterogeneity of the EU means that a uniform funding approach may not adequately cater to the specific needs, institutional capacities, or socio-economic contexts of all member states (Socol and Iuga, 2024). National administrative complexities, bureaucratic hurdles, and varying governance capabilities can create practical barriers to implementing EU-funded projects effectively, regardless of the soundness of the underlying EU logic. National political agendas and cultural attitudes towards research and innovation can also influence how receptive member states are to EU priorities (Marino and Cirillo, 2014). Moreover, the complex and varied drivers of brain drain within specific national contexts may require tailored solutions that extend beyond the standard EU funding frameworks (Socol and Iuga, 2024). Potential power imbalances within the EU could also mean that funding logic is shaped more by stronger states, making it less suitable for others (Mathies and Cantwell, 2022). This disconnect underscores the difficulty of applying a supranational funding strategy across a diverse continent and highlights the need for flexibility and better alignment between EU goals and national implementation realities.

To enhance the effectiveness of EU funds in retaining researchers and mitigating brain drain, several policy reforms are suggested. A fundamental step is increasing investment in higher education and research programs like Horizon Europe to provide more competitive funding opportunities (Socol and Iuga, 2024). Strategic implementation of existing initiatives, such as the European Universities Initiative, is also crucial (Khan, 2021). Funding allocation criteria should be reformed to prioritize transparency and meritocracy, applying strict scholarly peer review consistently to combat biases and ensure support for high-quality research (Marino and Cirillo, 2014). Funds should be more strategically targeted towards regions heavily affected by brain drain, specifically enhancing domestic opportunities, salaries, and working conditions (Socol and Iuga, 2024). Supporting knowledge spillover effects and educational programs within source countries could also create incentives to stay or return (Socol and Iuga, 2024). Enhancing collaboration networks within the EU, encouraging brain circulation through mobility programs, and actively supporting return migration and diaspora engagement are vital (Boc, 2020; World Bank, 2019). Addressing broader structural barriers related to quality of life and institutional effectiveness, potentially supported by EU funds, is necessary (Boc, 2020). Finally, improving the coordination between different EU funding sources is needed for greater coherence (Boc, 2020). The underlying logic should shift towards fostering 'brain circulation' within a competitive and cohesive European Research Area, rather than simply preventing departures, requiring long-term, strategic policies that address root causes (Khan, 2021).

## Conclusions and Policy Recommendations

The persistent challenge of research brain drain in Balkan EU Member States, despite significant EU financial support, highlights the limitations of external funding without concurrent domestic reform. Analysis reveals strong push factors prevalent in the region, including persistently low salaries, widespread corruption, political instability, institutional fragility, and severely limited career paths (Gherhes et al., 2020; Panagiotakopoulos, 2020; Iacob (Bâra), 2018; Pintarić and Župarić-Iljić, 2024). These deeply rooted issues create a difficult environment for retaining highly skilled researchers and directly counteract the compelling pull factors offered abroad, such as substantially higher wages, superior professional opportunities, advanced research infrastructure, and more stable, meritocratic environments (Apostu et al.,

2022; Labrianidis et al., 2022b; Pintarić and Župarić-Iljić, 2024). This outflow results in significant economic and research sector damage – including the loss of crucial human capital, reduced innovation capacity, weakened national competitiveness, and diminished scientific output (Iacob (Bâra), 2018; Labrianidis et al., 2023; Krammer, 2017; Tomić and Taylor, 2018).

The effectiveness of EU funding instruments, while valuable for infrastructure and mobility, is often constrained by substantial barriers within these nations. Weak governance, inadequate institutional capacity for absorption and management, prevalent socio-economic disparities, and weak reintegration mechanisms hinder the conversion of funds into sustainable retention outcomes (Boc, 2020; Commission, 2023).

Furthermore, a notable disconnect frequently exists between the EU's broad, cohesion-oriented funding logic and the specific, diverse national contexts, priorities, and talent strategies (Marino and Cirillo, 2014; Socol and Iuga, 2024).

Addressing this structurally embedded phenomenon, which shows common patterns suggesting a regional dynamic, therefore requires moving beyond ad hoc funding interventions toward a synergistic approach. EU support must be strategically coupled with comprehensive, integrated national strategies focused on deep-seated reforms. Policy recommendations consistently emphasize tackling corruption, improving education quality and relevance, investing strategically in RandD ecosystems (beyond just infrastructure), enhancing institutional effectiveness, and actively engaging diasporas while improving conditions for returnees (Botezat and Moraru, 2020; Kousis et al., 2022; Tomić and Taylor, 2018). At the EU level, research and cohesion policies should be recalibrated to better incentivize these crucial national reforms and support holistic ecosystem-building, fostering genuine brain circulation within a more equitable European Research Area. Tackling brain drain is essential not only for national development but for the long-term sustainability and dynamism of the European Research Area as a whole.

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