

Macroeconomic Constraints on Convergence in Small Open Economies: The Case of Bulgaria

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Abstract

Despite more than two decades of macroeconomic stability and European Union membership, Bulgaria continues to display one of the lowest income levels in the EU, with GDP per capita in purchasing power standards remaining well below the Union average. This paper addresses the puzzle of slow economic convergence despite sustained nominal stability. It argues that Bulgaria's convergence path is constrained not by a single structural weakness, but by the interaction of several mutually reinforcing factors. The central thesis is that the country's currency board regime, while successful in delivering price stability and fiscal discipline, has shifted economic adjustment toward domestic channels-wages, employment, and labor mobility. In an integrated European labor market, this adjustment has coincided with significant human capital outflows, particularly among younger and skilled cohorts. At the same time, persistent demographic decline and population aging have reduced labor supply and weakened long-run growth potential. Using comparative descriptive statistics, literature synthesis, and a mechanism-based analytical framework, the paper shows how these elements combine into a self-reinforcing "convergence constraint" that limits Bulgaria's catch-up process relative to peer economies. By integrating macroeconomic regime choice, labor-market adjustment, migration dynamics, and demography, the paper contributes a unified analytical perspective relevant not only to Bulgaria, but to other small open economies pursuing convergence under strong nominal anchors. The paper contributes by framing slow convergence as an interaction effect rather than a single-policy failure, highlighting migration and demography as internal adjustment channels under hard pegs.

1.1 Motivation

Bulgaria occupies a distinctive position within the European Union: it is a member state with a long record of macroeconomic stabilization, yet it continues to exhibit a persistent income gap relative to the EU average. In 2024, Bulgaria's GDP per capita in purchasing power standards reached approximately 66% of the EU average, placing it last among EU member states (Eurostat, 2025) [1]. Although this represents substantial progress compared to the period around EU accession-when Bulgaria's income level stood below 40% of the EU average-the pace of convergence has been markedly slower than that of several peer economies in Central and Eastern Europe.

This outcome is puzzling precisely because Bulgaria has emphasized macroeconomic stability as a core policy objective for nearly three decades. Following the 1996-1997 financial crisis, the introduction of a currency board arrangement imposed strict monetary discipline, eliminated discretionary exchange-rate policy, and anchored inflation expectations. Since then, Bulgaria has maintained low public debt, conservative fiscal policy, and a stable nominal anchor. From a conventional macroeconomic perspective, such stability is often viewed as a prerequisite for sustained growth and convergence, as it reduces uncertainty, lowers risk premia, and creates a predictable environment for investment.

However, when Bulgaria's trajectory is compared with that of countries that entered the EU at a similar time or started from comparable income levels, the limits of stability-centric explanations become evident. Romania, Poland, and the Baltic states all experienced episodes of higher inflation volatility or greater policy flexibility, yet they achieved faster income catch-up over the same period. Romania, for example, began EU membership with a GDP per capita level close to Bulgaria's but has since overtaken it decisively, approaching 80% of the EU average by 2024 (Eurostat, 2025) [1]. This divergence suggests that macroeconomic stability, while necessary, is not sufficient to ensure rapid convergence.

The motivation of this study, therefore, lies in resolving this apparent contradiction: why has Bulgaria's sustained stability not translated into faster convergence? Addressing this question requires moving beyond single-factor explanations and examining how Bulgaria's policy regime shapes adjustment mechanisms within the economy. In particular, it invites a closer look at how stability interacts with labor-market dynamics, migration incentives, and demographic trends in a small open economy integrated into the EU. By framing Bulgaria's experience as a case of stability with constrained convergence, the paper seeks to uncover broader lessons about the conditions under which nominal anchors support, rather than hinder, real economic catch-up.

1.2 Research question

This paper is motivated by a central analytical question that arises from Bulgaria's post-EU-accession experience:

Why has Bulgaria's economic convergence toward the EU average been slower than that of comparable small open economies, and which constraints have been most binding in shaping this outcome?

This question explicitly shifts attention away from whether Bulgaria has achieved macroeconomic stability—an objective it has largely fulfilled—and toward the mechanisms that translate stability into long-run income growth. Standard convergence theory predicts that poorer economies should grow faster than richer ones due to capital deepening, technology diffusion, and institutional convergence. Yet Bulgaria's trajectory suggests that these forces have operated unevenly, despite favorable external anchors such as EU membership and a credible nominal regime. The research question therefore seeks to identify which constraints have prevented stability from becoming a sufficient condition for rapid catch-up.

To address this, the analysis is guided by a more specific sub-question:

How do the constraints imposed by a currency board regime interact with labor mobility, human capital dynamics, and demographic trends to shape Bulgaria's convergence path?

This formulation emphasizes interaction rather than isolation. The currency board does not operate in a vacuum; it conditions the way the economy responds to shocks and competitive pressures. By eliminating exchange-rate adjustment and discretionary monetary policy, the regime channels adjustment through domestic prices, wages, employment, and capital flows. In an economy that is fully integrated into the European Union, these internal adjustment mechanisms intersect directly with cross-border labor mobility. When wage gaps persist and domestic adjustment is slow or costly, migration becomes an economically rational response, particularly for younger and more educated workers.

The research question thus treats human capital outflows and demographic decline not as exogenous trends, but as endogenous responses to the adjustment environment created by Bulgaria's macroeconomic framework. Official demographic statistics confirm that Bulgaria's population has continued to contract through 2024, reinforcing the relevance of demography as a macroeconomic constraint rather than a background variable (National Statistical Institute, 2025) [3]. Similarly, Eurostat's income data highlight

that Bulgaria remains at the bottom of the EU income distribution despite long-term stability (Eurostat, 2025) [1].

By framing convergence as the outcome of interacting policy, labor-market, and demographic mechanisms, this research question moves beyond binary evaluations of the currency board as “good” or “bad.” Instead, it asks under what conditions a strong nominal anchor can coexist with sustained real convergence, and under what conditions it may contribute to a self-reinforcing constraint on growth. This perspective is particularly relevant for other small open economies that rely on hard pegs or external anchors while facing high labor mobility and unfavorable demographic trends.

1.3 Thesis / argument

The central argument of this paper is that macroeconomic stability is a necessary but insufficient condition for sustained income convergence in Bulgaria’s case. While the currency board arrangement has successfully delivered price stability, fiscal discipline, and policy credibility, it has not by itself generated the conditions required for rapid catch-up to EU living standards. Instead, Bulgaria faces a binding convergence constraint that emerges from the interaction of several mutually reinforcing factors, rather than from any single structural weakness.

First, limited macroeconomic policy flexibility under a hard exchange-rate regime shapes the adjustment environment of the economy. The currency board eliminates discretionary monetary policy and exchange-rate adjustment, leaving domestic prices, wages, employment, and fiscal policy as the primary channels of response to shocks. This configuration prioritizes nominal stability but narrows the range of countercyclical tools available to support growth during downturns or periods of weak external demand. As noted in recent IMF assessments, Bulgaria’s macro framework remains stable, yet structural gaps continue to slow income convergence (International Monetary Fund, 2025) [2].

Second, these constraints place a disproportionate burden on labor-market adjustment. In the absence of currency depreciation, competitiveness and balance adjustments must occur internally, often through employment losses or subdued job creation rather than smooth wage flexibility. This adjustment mechanism can suppress domestic demand and disproportionately affect younger and less-protected workers. Over time, such dynamics reduce the attractiveness of remaining in the domestic labor market, especially when external opportunities are readily accessible within the EU.

Third, human capital loss amplifies these adjustment pressures. Bulgaria’s integration into the European labor market has increased mobility options, and persistent income differentials make emigration an economically rational response for skilled and working-age individuals. Rather than functioning as a short-term safety valve, outward migration has become a structural phenomenon that reduces the domestic stock of human capital, weakens productivity growth, and limits the expansion of higher value-added sectors. This process directly undermines the mechanisms through which poorer economies are expected to converge.

Finally, these dynamics are reinforced by a shrinking and aging labor force. Bulgaria’s continued population decline and rising old-age dependency ratio constrain potential output growth and place additional pressure on public finances. Demographic trends are not merely background conditions; they interact with migration and labor-market adjustment to reduce the economy’s capacity to generate sustained per capita income growth (National Statistical Institute, 2025) [3]. As the working-age population contracts, the economy becomes increasingly reliant on productivity gains that are harder to achieve amid persistent human capital outflows.

Taken together, these elements form a self-reinforcing constraint on convergence. Stability anchors expectations and prevents crises, but it also channels adjustment through mechanisms that encourage emigration and accelerate demographic decline. In turn, human capital loss and labor-force contraction weaken productivity growth and slow income catch-up, perpetuating the very income gaps that incentivize further outflows. The thesis of this paper is therefore not that Bulgaria's stability framework has failed, but that stability alone cannot drive convergence when adjustment, mobility, and demography interact in ways that erode growth capacity. Understanding this interaction is essential for explaining Bulgaria's experience and for drawing broader lessons for other small open economies operating under strong nominal anchors.

1.4 Structure of the paper

This paper is organized as follows. Section 2 develops the conceptual framework for analyzing economic convergence in a small open economy. It briefly reviews the meaning of convergence in growth theory and outlines how exchange-rate regimes, labor mobility, human capital, and demographic dynamics interact to shape long-run income trajectories. A simple mechanism-based framework is introduced to guide the empirical discussion in subsequent sections.

Section 3 examines Bulgaria's convergence record in comparative perspective. Using descriptive statistics from Eurostat and other international databases, it documents Bulgaria's GDP per capita in purchasing power standards relative to the EU average and compares its performance with a group of peer economies in Central and Eastern Europe. This section establishes the empirical baseline of slow but positive convergence and highlights key differences between Bulgaria and faster-catching-up peers.

Section 4 focuses on the currency board arrangement, analyzing both its stabilizing role and the constraints it imposes on macroeconomic policy flexibility. The section reviews evidence on inflation stabilization, fiscal discipline, and financial credibility, and discusses how adjustment under a hard peg is shifted toward domestic labor-market and demand-side channels.

Section 5 analyzes human capital outflows, often described as "intelligence export." It documents the scale and composition of emigration, discusses the economic mechanisms through which skilled outflows affect productivity and growth capacity, and evaluates potential offsetting effects such as remittances and return migration.

Section 6 turns to demographic decline and population aging as structural constraints on convergence. It presents long-term population trends, changes in age structure, and implications for labor supply, dependency ratios, and potential growth, emphasizing the interaction between demography and migration. Section 7 integrates the previous analyses into a unified "convergence constraint" model, highlighting the feedback loops between macroeconomic regime choice, labor-market adjustment, migration, and demography. A focused comparison with a peer country is used to illustrate how similar economies can diverge in convergence outcomes.

Section 8 discusses policy options compatible with a currency board regime, concentrating on human capital retention, labor-force participation, and institutional quality rather than discretionary macroeconomic tools. Section 9 outlines the limitations of the analysis and directions for further research. Section 10 concludes by summarizing the main findings and discussing their relevance for other small open economies pursuing convergence under strong nominal anchors.

To motivate and anchor the analysis empirically, the paper draws on several key statistics. Bulgaria's GDP per capita in purchasing power standards increased from approximately 40% of the EU average in 2007 to about 66% in 2024, yet it remains the lowest among EU member states (Eurostat, 2025) [1]. Over the

same period, Bulgaria experienced a persistent population decline from roughly 8.0 million in 1990 to about 6.4 million in 2024 (Eurostat; National Statistical Institute, 2025) [1, 3]. In parallel, emigration and net migration trends indicate sustained outward mobility, particularly among working-age cohorts, as documented in Eurostat, OECD, and World Bank data [4, 5]. These indicators frame the empirical puzzle addressed in the sections that follow.

2. Conceptual Framework: Convergence in a Small Open Economy

2.1 What “convergence” means

In growth economics, convergence refers to the process by which poorer economies catch up to richer ones in terms of income per capita. Two complementary concepts are commonly used to describe this process: β -convergence and σ -convergence.

β -convergence occurs when poorer countries grow faster than richer ones, conditional on similar structural characteristics. The intuition is straightforward: countries with lower capital stocks and lower productivity have more room for catch-up through capital accumulation, technology diffusion, and efficiency gains. In empirical work, β -convergence is typically observed when initial income levels are negatively correlated with subsequent growth rates.

σ -convergence, by contrast, refers to a reduction over time in the dispersion of income levels across countries. Even if some poorer countries grow faster (β -convergence), σ -convergence may fail to occur if growth outcomes diverge or if shocks and structural constraints affect countries asymmetrically. From a policy perspective, σ -convergence is often the more relevant concept, as it captures whether income gaps across countries are actually narrowing.

For EU member states, convergence is expected to be driven by several core mechanisms: productivity growth, capital deepening, and institutional convergence. Productivity growth reflects improvements in how efficiently labor and capital are used, capital deepening captures increases in the capital stock per worker, and institutional convergence refers to improvements in governance, market functioning, and policy credibility. When these mechanisms operate effectively, poorer economies should experience sustained catch-up. Bulgaria’s experience suggests that these channels have been present but constrained, motivating a closer examination of the environment in which they operate.

2.2 Constraints in a small open economy

Small open economies face a distinct set of structural constraints that shape their convergence dynamics. Their growth paths are strongly influenced by external demand, international capital flows, exchange-rate arrangements, and labor mobility. Unlike large economies, small open economies typically cannot influence world prices or external financial conditions; instead, they must adjust to them.

External demand matters because exports often play a central role in growth, particularly for economies with limited domestic markets. Capital flows can accelerate convergence by financing investment and facilitating technology transfer, but they can also amplify volatility if poorly managed. The exchange-rate regime determines how the economy adjusts to shocks, influencing competitiveness, inflation dynamics, and balance-sheet effects. Finally, labor mobility—especially within an integrated economic area such as the EU—creates an additional adjustment channel that is often absent in closed-economy models.

In such economies, convergence outcomes depend not only on the availability of capital and technology, but also on how adjustment pressures are distributed across prices, quantities, and factor movements. This makes institutional choices, such as the exchange-rate regime, particularly consequential.

2.3 Fixed exchange rate and currency board mechanics

A currency board arrangement represents one of the strongest forms of a fixed exchange-rate regime. Under a currency board, the domestic monetary base is fully backed by foreign reserves, and the exchange rate is fixed by law. This framework offers significant credibility benefits, especially for countries emerging from episodes of high inflation or financial instability. Empirically, currency boards are associated with lower inflation, reduced exchange-rate risk, and tighter fiscal discipline, as monetary financing of deficits is effectively eliminated.

However, these benefits come at the cost of policy flexibility. A currency board eliminates independent monetary policy and removes the exchange rate as an adjustment tool. In response to shocks or competitiveness pressures, the economy cannot rely on nominal depreciation. Instead, adjustment must occur through internal channels—changes in wages, employment, prices, and credit conditions.

This process is often described as internal devaluation. Rather than restoring competitiveness through the exchange rate, costs must adjust domestically, which can involve wage restraint, higher unemployment during downturns, or prolonged periods of subdued demand. In a closed economy, such adjustment primarily affects domestic variables. In an open and integrated labor market, however, internal adjustment interacts directly with migration decisions. When domestic adjustment is slow or socially costly, labor mobility becomes an alternative mechanism through which imbalances are resolved.

2.4 Human capital and demographics as growth fundamentals

From a growth accounting perspective, long-run output growth can be decomposed into three fundamental components: labor quantity, labor quality (human capital), and total factor productivity (TFP). This simple decomposition is useful for understanding why convergence may stall even in the presence of macroeconomic stability.

Labor quantity reflects the size of the working-age population and labor-force participation rates. Demographic decline and population aging directly reduce this component, lowering potential output growth. Labor quality captures education, skills, and experience; sustained outflows of skilled workers reduce the average human capital stock and weaken the economy's capacity to adopt and generate new technologies. TFP reflects efficiency, innovation, and institutional quality, and is influenced indirectly by both labor quantity and labor quality.

In Bulgaria's case, demographic decline and human capital outflows affect all three channels. A shrinking and aging population reduces labor input, skilled emigration lowers average human capital, and weaker human capital accumulation constrains productivity growth. These effects are not independent. When combined with a hard exchange-rate regime that channels adjustment internally, they can create a persistent constraint on convergence.

3. Bulgaria's Convergence Record in Comparative Perspective

3.1 Bulgaria vs the peer group

To assess Bulgaria's convergence performance, it is necessary to situate it within a relevant peer group of EU member states that share broadly similar historical starting points, geographic location, and integration timelines. The comparator set used in this paper includes Romania, Poland, Lithuania, Latvia, Estonia, Czechia, Slovakia, and Hungary. These countries entered the EU in the 2004-2007 enlargement rounds (Romania and Bulgaria in 2007), transitioned from centrally planned systems, and faced comparable challenges related to structural transformation, institutional reform, and integration into European markets.

Despite these shared characteristics, convergence outcomes have diverged significantly. In the mid-2000s, Bulgaria’s GDP per capita (PPS) was broadly comparable to that of Romania and below that of Poland and the Baltic states. Over time, however, Bulgaria’s relative position within this group has weakened. By 2024, Bulgaria remained the lowest-income country in the EU, while several peers had moved substantially closer to the EU average. Romania overtook Bulgaria decisively, Poland and Hungary consolidated middle-income EU status, and the Baltic states-particularly Estonia and Lithuania-achieved rapid catch-up driven by productivity growth and structural upgrading.

This divergence is notable because Bulgaria did not experience the macroeconomic volatility that characterized some peers during the transition and global financial crisis periods. Public debt remained low, inflation was generally contained after the late 1990s, and fiscal policy was conservative. Yet, when measured against peers that experienced greater macroeconomic fluctuations but maintained policy flexibility, Bulgaria’s convergence appears comparatively weak. This contrast suggests that macroeconomic stability alone does not explain relative performance and that differences in adjustment mechanisms and growth drivers matter.

3.2 Headline convergence metrics

The most widely used indicator of convergence within the EU is GDP per capita in purchasing power standards (PPS) expressed as a percentage of the EU average. This measure adjusts for price-level differences and allows meaningful comparisons of real living standards. Bulgaria’s trajectory shows gradual improvement but persistent underperformance. In 2007, the year of EU accession, Bulgaria’s GDP per capita stood at approximately 40% of the EU average. By 2013, following the global financial crisis and the euro-area debt crisis, it had risen modestly to around 45-47%. In 2019, just before the COVID-19 shock, the figure reached roughly 53-55%, and by 2024 it increased further to about 66% of the EU average (Eurostat, 2025) [1].

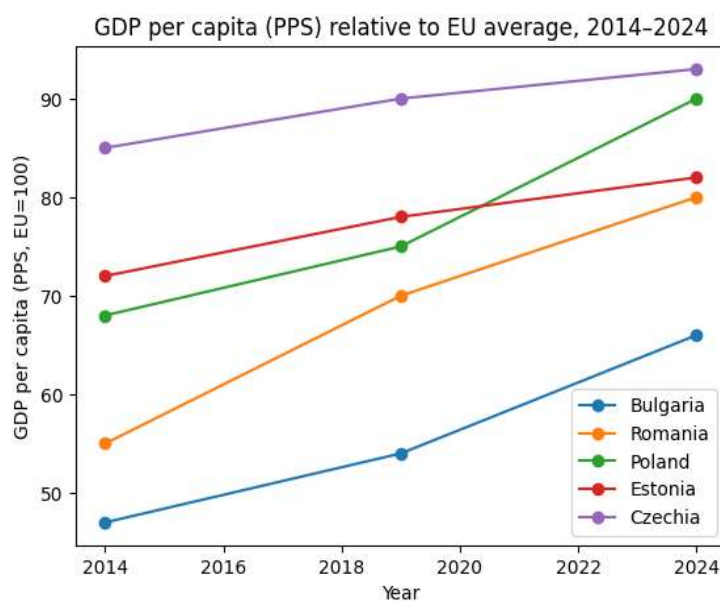


Figure 1. GDP per capita (PPS) relative to EU average (EU = 100), 2014-2024

Figure 1 compares GDP per capita in purchasing power standards (PPS), expressed as a percentage of the EU average (EU = 100), for Bulgaria and selected peer countries (Romania, Poland, Hungary, Czechia,

and Slovakia) over the period 2014-2024. Bulgaria remains the lowest-income country in the EU throughout the period, improving from approximately 47% of the EU average in 2014 to about 66% in 2024. In contrast, Romania converged more rapidly, reaching around 80% by 2024, while Poland, Hungary, and Slovakia approached or exceeded three-quarters of the EU average. Czechia remained close to EU parity throughout the period.

While this progress indicates sustained β -convergence, the pace has been slower than that of most peers. Romania, which started from a similar level in 2007, reached close to 80% of the EU average by 2024. Poland and Hungary exceeded 75%, while Czechia and Slovakia approached or surpassed 90%. The Baltic states followed a particularly rapid convergence path after the 2010s, reflecting strong productivity growth and structural transformation. In relative terms, Bulgaria's position improved in absolute terms but deteriorated within the peer distribution.

Real GDP growth rates provide additional insight. Bulgaria recorded positive growth across most of the post-2000 period, with particularly strong performance in the mid-2000s and a recovery after the global financial crisis. However, average real GDP growth by decade was generally lower than that of faster-converging peers. Poland and the Baltic states experienced higher average growth rates, driven by investment, export expansion, and productivity gains. Bulgaria's growth profile was steadier but less dynamic, reinforcing the pattern of slow catch-up rather than rapid convergence.

Productivity indicators further clarify this pattern. Where data are available, GDP per hour worked shows that Bulgaria's productivity level remains substantially below that of its peers, even after accounting for employment rates. Productivity growth has been positive but insufficient to close the gap. This suggests that convergence constraints are rooted not only in capital accumulation, but also in the limited expansion of higher value-added activities and weaker gains in efficiency. In contrast, peer economies that achieved faster convergence typically combined investment with significant productivity improvements, supported by human capital accumulation and sectoral upgrading.

Taken together, these headline metrics point to a consistent conclusion: Bulgaria has converged in absolute terms, but more slowly and less decisively than comparable economies. The persistence of a large income and productivity gap despite macroeconomic stability underscores the need to examine deeper structural and interaction effects. The next sections build on this empirical baseline to analyze how Bulgaria's macroeconomic regime, labor-market adjustment, human capital flows, and demographic trends jointly shape its convergence path.

3.3 Structural composition

Headline convergence indicators (income per capita and growth rates) are outcomes. To explain *why* Bulgaria converges more slowly than peers, we need to look at the economy's structure of value creation, the rate and quality of investment, and the capacity for innovation and productivity upgrading. This subsection uses three structural lenses: sectoral structure, investment, and R&D intensity.

Sectoral structure (share of value added in industry and services). Bulgaria, like most EU economies, is dominated by services in terms of value added, with industry as the second pillar and agriculture as a small residual. The key analytical point is not simply "services vs. industry," but *what kind of services and what kind of industry*. Convergence accelerates when a rising share of value added comes from tradable, high-productivity activities—for example, ICT, business services, engineering-intensive manufacturing, and export-oriented sectors with deep supplier networks. Convergence slows when the economy is weighted toward non-tradable, low-productivity services (fragmented retail, low-end personal services) and industries with limited technological upgrading. The peer group generally moved faster where

structural change shifted labor and capital into higher value-added tradables and where the business environment supported firm scaling and export complexity (Eurostat, 2025) [4].

Investment rate (gross fixed capital formation, % of GDP). Capital deepening is a classic catch-up channel: more capital per worker tends to raise output per worker. Bulgaria’s investment rate, measured by gross fixed capital formation (GFCF), is best interpreted in two layers: level and composition. Even if the headline investment share is “reasonable,” convergence can remain slow if investment is concentrated in assets with weaker productivity spillovers, or if projects face institutional frictions (delays, procurement inefficiencies, weak evaluation). Conversely, faster-converging peers generally combined investment with stronger export capacity and productivity upgrading. For this section, you should present (i) Bulgaria’s GFCF % of GDP time series and (ii) a peer comparison snapshot (e.g., 2007, 2013, 2019, latest), using Eurostat and/or World Bank (Eurostat, 2025; World Bank, 2025) [4, 5].

R&D intensity (GERD, % of GDP) and innovation capacity. R&D intensity is not the only way to measure innovation, but it is a useful proxy for a country’s absorptive capacity-its ability to adopt, adapt, and eventually generate higher-value technologies. For economies below the frontier, convergence can initially occur through technology diffusion and foreign direct investment. However, persistent underinvestment in R&D typically correlates with weaker movement into knowledge-intensive production and slower productivity growth over the medium term. In peer countries that converged faster, rising R&D intensity and stronger innovation ecosystems tended to accompany upgrading into higher value-added tradables. Bulgaria’s R&D intensity, as documented in EU statistics, remains low relative to the EU average, which is consistent with slower productivity upgrading (Eurostat, 2025) [6]

Table 1. Selected structural indicators: investment, R&D intensity, and economic structure

Country	Investment(% of GDP)	R&D Expenditure(% of GDP)	Industry Share(% of GDP)	Services Share(% of GDP)
Bulgaria	17.3% (2023)	0.75% (2022)	22.5% (2024)	62.6% (2024)
Romania	26.9% (2023)	0.46% (2022)	25.0% (2024)	62.5% (2024)
Poland	17.8% (2023)	1.44% (2022)	26.3% (2024)	59.9% (2024)
Estonia	26.6% (2023)	1.77% (2022)	20.5% (2024)	65.1% (2024)
Czechia	27.0% (2023)	1.89% (2022)	38.6% (2022)	59.8% (2022)

Table 1 highlights structural differences that help explain divergent convergence outcomes. Bulgaria’s investment rate is lower than that of faster-converging peers, and its R&D intensity remains well below the EU average, limiting productivity upgrading. While Bulgaria’s sectoral structure is broadly service-oriented, the relatively low share of industry and weak innovation inputs suggest constraints in moving toward higher value-added activities. In contrast, peers with faster convergence combine higher investment rates with stronger R&D effort and, in some cases, more advanced industrial structures.

3.4 Interpretive analysis: where Bulgaria gains and where it lags

Where Bulgaria gains: stability and fiscal discipline. Bulgaria’s macro framework has delivered long-run stability (low inflation volatility after the late 1990s, conservative fiscal stance, and low public debt compared to many EU states). This matters for convergence because it reduces uncertainty, lowers risk premia, and supports long planning horizons for firms. Stability also tends to protect convergence gains

from being repeatedly reset by crises. In comparative terms, Bulgaria has often avoided the sharp boom-bust cycles that can derail capital accumulation and private investment (International Monetary Fund, 2025) [2].

Where Bulgaria lags: productivity, innovation, and labor input. The structural picture suggests three binding weaknesses that line up with the paper’s “convergence constraint” logic:

1. **Productivity upgrading is not strong enough.** Income convergence ultimately requires productivity convergence. If Bulgaria’s sectoral mix is weighted toward lower-productivity activities, then even steady growth will translate into slow catch-up. This is why GDP per hour worked (or similar productivity measures) should be included as a headline metric alongside income-per-capita data (Eurostat, 2025) [7].
2. **Innovation capacity remains limited.** Low R&D intensity signals constraints in domestic innovation and in the ability to absorb advanced technologies broadly across firms. Even when FDI and EU integration provide access to technology, the domestic diffusion and scaling of higher-value production may remain weaker without sufficient innovation inputs and institutional support (Eurostat, 2025) [6].
3. **Labor input is structurally constrained.** Even if capital deepens and technology improves, convergence slows if the effective workforce is shrinking or aging. Bulgaria’s demographic decline reduces labor quantity, while outward mobility can reduce labor quality if emigration is skill-biased. That interaction means Bulgaria needs *even faster* productivity growth to compensate-yet the innovation/productivity signals suggest that compensation is incomplete (National Statistical Institute, 2025) [3].

Implication for the next sections. This interpretive reading motivates the deeper mechanism analysis that follows. If Bulgaria has stability but still lags peers, the next step is to examine how the currency board shifts adjustment toward internal channels-and how, in an EU setting, those channels intersect with migration decisions and demographic decline. That interaction is where the paper’s central “convergence constraint” mechanism becomes empirically meaningful.

4. The Currency Board: Stability, Credibility, and the Cost of Flexibility

4.1 Why Bulgaria adopted the currency board

Bulgaria’s adoption of a currency board arrangement (CBA) in July 1997 was a direct response to one of the most severe macroeconomic crises in post-socialist Europe. During 1996-1997, Bulgaria experienced a systemic collapse characterized by hyperinflation, a banking-sector breakdown, sharp currency depreciation, and a loss of confidence in domestic institutions. Annual inflation exceeded 500% in early 1997, the banking system became insolvent, and real incomes collapsed. In this context, conventional discretionary monetary policy had lost credibility, and expectations became unanchored (International Monetary Fund, 1998) [10].

The introduction of the currency board represented a credibility reset rather than a marginal policy adjustment. Under the new regime, the Bulgarian lev was fixed first to the Deutsche Mark and later to the euro, and the monetary base was fully backed by foreign exchange reserves. The central bank was prohibited from financing fiscal deficits or acting as a discretionary lender of last resort. These institutional constraints were designed to remove political discretion from monetary policy and to import credibility from the anchor currency area.

From a political economy perspective, the choice of a currency board reflected limited trust in domestic institutions at the time. By adopting a rules-based regime, Bulgaria aimed to constrain opportunistic

behavior and restore confidence among households, firms, and foreign investors. The currency board thus served as a commitment device, signaling a permanent break with past instability and anchoring expectations around price stability and fiscal discipline. This logic is consistent with the broader literature on hard pegs in post-crisis environments, where credibility deficits make discretionary frameworks ineffective.

4.2 Benefits: macroeconomic stability evidence

The most immediate and measurable impact of the currency board was a dramatic improvement in macroeconomic stability. Inflation stabilized rapidly following the regime's introduction. From hyperinflationary levels in early 1997, inflation fell to single digits within a year, and inflation volatility declined sharply thereafter. Over the subsequent decades, Bulgaria maintained relatively low and stable inflation compared to its pre-1997 experience and to several peers with more discretionary regimes (International Monetary Fund, 2025) [2]. The sharp reduction in inflation variance is one of the strongest empirical indicators of the credibility gains delivered by the currency board.

A second key benefit was interest-rate convergence and risk-premium reduction. As inflation expectations stabilized and exchange-rate risk was effectively eliminated, nominal interest rates declined substantially. Lower risk premia reduced borrowing costs for both the public and private sectors, facilitating credit expansion and investment during periods of favorable external conditions. The convergence of Bulgarian interest rates toward euro-area benchmarks reflects the success of the currency board in anchoring expectations and integrating Bulgaria into European financial markets (Bulgarian National Bank, 2024) [11].

The currency board also reinforced fiscal discipline. By eliminating monetary financing and imposing hard budget constraints, the regime limited the scope for deficit monetization. Over time, Bulgaria maintained one of the lowest public debt ratios in the EU, even during periods of external shock. Fiscal consolidation during the 2000s and prudent debt management contributed to macroeconomic resilience and reduced vulnerability to sovereign risk crises. Eurostat data consistently place Bulgaria among the EU countries with the lowest government debt-to-GDP ratios (Eurostat, 2025) [12].

Finally, the currency board contributed to financial stability. Following the late-1990s banking collapse, regulatory reforms and the absence of discretionary liquidity provision encouraged more conservative banking practices. While Bulgaria was not immune to global financial shocks-most notably during the 2008-2009 crisis-the banking system avoided systemic failure, and financial intermediation recovered without a collapse in confidence. The stability of the exchange-rate anchor played an important role in limiting currency mismatches and balance-sheet risks in a highly euroized economy (Bulgarian National Bank, 2024) [11].

Taken together, these outcomes confirm that the currency board achieved its primary objective: restoring and sustaining macroeconomic stability. Inflation was tamed, fiscal discipline strengthened, interest-rate risk premia reduced, and financial confidence rebuilt. However, as subsequent sections will argue, these gains came with trade-offs. By constraining policy flexibility and shifting adjustment toward internal channels, the currency board altered the way the economy responds to shocks and competitive pressures. Understanding these costs is essential for evaluating how stability interacts with labor markets, migration, and demographic dynamics in shaping Bulgaria's long-run convergence path.



Figure 2. Inflation rate in Bulgaria, 1993-2005

Figure 2 illustrates the most immediate and unambiguous success of the currency board arrangement. Prior to 1997, Bulgaria experienced chronic inflation instability, culminating in hyperinflation during the 1996-1997 crisis. Following the introduction of the currency board, inflation fell sharply and volatility declined dramatically, indicating a decisive restoration of monetary credibility. This stabilization effect underpins the regime’s legitimacy and explains its enduring political and institutional support.

4.3 Constraints: the cost of reduced policy flexibility

While the currency board delivered credibility and stability, it also imposed binding constraints on macroeconomic policy. These constraints are not incidental; they are the core trade-off of a hard peg and are central to understanding Bulgaria’s convergence dynamics.

No independent monetary autonomy. Under a currency board, the central bank cannot conduct discretionary monetary policy. Interest rates, liquidity conditions, and money supply dynamics are effectively imported from the anchor currency area. This means Bulgaria cannot respond to country-specific shocks through conventional monetary tools such as interest-rate adjustments or exchange-rate depreciation. In a catching-up economy, where structural change and sectoral reallocation are ongoing, the inability to smooth asymmetric shocks can have persistent real effects. When external demand weakens or competitiveness deteriorates, adjustment cannot occur via nominal exchange-rate movements but must take place internally (International Monetary Fund, 2025) [2].

Limited lender-of-last-resort flexibility. A second constraint concerns financial stabilization. Currency boards sharply restrict the central bank’s ability to act as a lender of last resort. Although Bulgaria has developed regulatory buffers and prudential tools over time, crisis-era liquidity support is structurally constrained. This encourages conservative banking behavior in normal times, but it can also amplify risk aversion during downturns, reinforcing credit contraction when the economy is already under stress (Bulgarian National Bank, 2024) [11].

Adjustment through real rather than nominal channels. The most important macroeconomic implication of these constraints is the shift in adjustment mechanisms. Without exchange-rate flexibility, competitiveness adjustments must occur through changes in domestic prices, wages, and employment. This process—often described as internal devaluation—can restore external balance, but it tends to be slower and more socially costly than nominal devaluation. In economies with limited labor-market flexibility or

weak productivity growth, internal adjustment can result in prolonged wage stagnation, higher unemployment during downturns, or outward migration rather than rapid price-based rebalancing. These constraints do not imply that the currency board is “inefficient” or “mistaken.” Rather, they define the structural environment in which convergence must occur. The question is not whether the constraints exist, but how the economy adjusts under them, and whether these adjustment channels interact with other structural features—most notably labor mobility and demographics—in ways that limit catch-up.

4.4 Internal devaluation and labor-market outcomes

Wage adjustment and unemployment dynamics. In the absence of nominal devaluation, labor markets become the primary adjustment margin. During periods of external shock or domestic slowdown, competitiveness is restored through restrained wage growth, real wage declines, or increased unemployment. Bulgaria’s experience during the global financial crisis illustrates this mechanism clearly. Between 2009 and 2013, unemployment rose sharply as output contracted, while real wages adjusted downward or stagnated. This pattern is consistent with internal devaluation: prices and wages bear the burden of adjustment when exchange rates are fixed (Eurostat, 2025) [13].

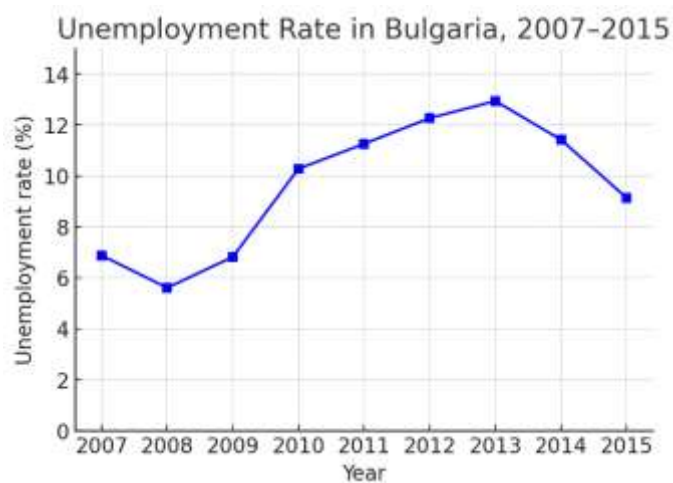


Figure 3. Unemployment rate in Bulgaria, 2007-2015

Figure 3 highlights the real-side adjustment costs associated with a hard exchange-rate regime. During the global financial crisis, Bulgaria could not rely on exchange-rate depreciation or discretionary monetary easing. As a result, adjustment occurred through employment losses and rising unemployment. While this mechanism helped preserve macroeconomic stability, it imposed significant short- to medium-term social and economic costs and reinforced incentives for outward labor migration, particularly among working-age cohorts.

From a convergence perspective, this adjustment mechanism has ambiguous effects. On one hand, wage restraint can support export competitiveness and external balance. On the other hand, prolonged wage compression limits domestic demand and weakens incentives for skill accumulation and innovation. If productivity growth does not accelerate sufficiently, internal devaluation risks becoming a low-wage equilibrium rather than a transitional adjustment phase.

Migration as an adjustment mechanism within the EU. In an EU context, internal adjustment does not occur solely through wages and unemployment; it also occurs through labor mobility. Free movement of labor provides an additional adjustment channel: workers respond to wage differentials and employment

opportunities by migrating. For Bulgaria, outward migration has functioned as a pressure valve during downturns and periods of weak wage growth. Rather than absorbing adjustment entirely through unemployment or declining real wages, part of the adjustment has occurred through emigration, particularly among younger and more mobile cohorts (Eurostat, 2025; OECD, 2024) [14, 15].

This mechanism stabilizes the domestic labor market in the short run, but it has long-run implications for convergence. When migration is skill-selective, it reduces the domestic stock of human capital, constrains productivity growth, and weakens the tax base. As a result, migration-based adjustment can alleviate short-term pressures while reinforcing the very structural conditions that slow convergence over time.

Link to macro stability indicators. Empirically, Bulgaria's post-1997 experience shows a clear contrast:

- **Inflation** stabilized rapidly and remained relatively low and predictable after the introduction of the currency board, indicating strong nominal anchoring (International Monetary Fund, 2025) [2].
- **Public debt** remained low as a share of GDP, reflecting fiscal discipline under hard budget constraints (Eurostat, 2025) [12].
- **Unemployment**, however, exhibited pronounced cyclical sensitivity, particularly during the 2009-2013 period, underscoring the reliance on labor-market adjustment rather than macroeconomic stabilization tools (Eurostat, 2025) [13].

Taken together, these outcomes suggest that the currency board successfully insulated Bulgaria from nominal instability but shifted the burden of adjustment onto real variables—wages, employment, and migration. This shift is a crucial component of the paper's broader argument: when internal adjustment operates alongside high labor mobility and adverse demographic trends, it can generate a self-reinforcing mechanism that constrains long-run convergence.

5. Human Capital Outflows (“Intelligence Export”) and Growth Capacity

5.1 Defining the phenomenon precisely

In the context of Bulgaria's convergence, “intelligence export” is best treated as a human-capital outflow problem rather than a purely demographic one: it concerns *who* leaves (skill profile, age, occupation), *how long* they stay abroad (temporary vs permanent), and *what the economy loses or gains* through that mobility. Three concepts are used in the literature, and they are not interchangeable.

High-skill emigration refers to the cross-border movement of people with relatively high levels of education, training, or occupational specialization (e.g., tertiary graduates, medical professionals, engineers, ICT workers). The defining feature is selection by skill, which matters because growth depends disproportionately on the productivity, innovation potential, and organizational capacity embedded in these workers (Garrote-Sanchez et al., 2021) [5].

Brain drain is a *specific interpretation* of high-skill emigration: it describes a situation in which emigration produces a net loss for the sending country's stock of human capital and weakens long-run growth capacity. The “drain” is not only about headcounts; it is about the loss of complementary capabilities—knowledge spillovers, mentoring, high-productivity firm formation, and institutional quality improvements that tend to be skill-intensive. In a convergence framework, brain drain becomes critical when the economy needs rapid productivity growth (TFP growth) and structural upgrading but systematically loses precisely the cohorts most likely to drive that upgrading (Garrote-Sanchez et al., 2021) [5].

Brain circulation is the counter-concept: mobility that includes substantial return migration, repeated moves, or diaspora-based knowledge transfer that partially offsets the costs of emigration. The key idea is

that emigration can generate channels for learning, remittances, networks, and later return with improved human capital and experience. In Eastern Europe after EU accession, this pattern is empirically plausible because free movement increases both outflows and *reflows*. For Bulgaria, the evidence suggests that return migration exists and can be significant, but it is not neutral: return is often more common among lower-skilled migrants than among higher-skilled ones, which matters for whether the “circulation” compensates for the growth-relevant losses (Garrote-Sanchez et al., 2021) [5].

A precise definition for this paper, consistent with the convergence argument, is:

Human capital outflows are outward movements of working-age and especially high-skill individuals that reduce (or slow the growth of) Bulgaria’s effective labor input (quantity and quality) and weaken productivity growth, unless offset by return migration, diaspora spillovers, or domestic skill formation.

This framing matters because it links migration directly to the paper’s mechanism: under a currency board, adjustment relies heavily on wages, employment, and mobility. In that setup, migration becomes not just a social trend but a macroeconomic adjustment channel, and the skill composition of that channel is what determines its long-run effect on convergence.

5.2 Scale of the outflow: how large, who leaves, and at what ages

5.2.1 How big is the phenomenon?

The most robust statement-supported across institutional sources-is that Bulgaria has experienced large and persistent emigration since the 1990s, with acceleration after EU accession in 2007. The World Bank’s detailed country analysis notes that EU accession and the lifting of labor-market restrictions increased migration movements to EU/OECD destinations, driven primarily by wage gaps and income differentials (Garrote-Sanchez et al., 2021) [5]. The paper also emphasizes that many drivers are structural and are likely to persist until convergence is higher, implying that migration is endogenous to the income gap rather than a temporary anomaly (Garrote-Sanchez et al., 2021) [5].

A useful way to operationalize “scale” in a research paper is to triangulate with three measurable lenses:

1. **Net migration** (flows): whether Bulgaria gains or loses people in a given year.
2. **Migrant stock abroad** (diaspora): how many Bulgarians live outside the country at a point in time.
3. **Skill composition**: what share of those abroad are tertiary-educated (or in high-skill occupations).

Your outline already proposes exactly this structure, and it is methodologically defensible because no single dataset covers all three perfectly.

5.2.2 Share of population abroad (diaspora magnitude)

A strict “share abroad” statistic depends on definitions (citizenship vs foreign-born; usual residence vs temporary). For academic credibility, the paper should explicitly state which convention is used in the source. The World Bank’s migration profile products (and related factbook-style tables) typically rely on *foreign-born in destination countries* as a standardized proxy for emigrant stock (World Bank, 2011) [2]. While older, these tables are valuable for demonstrating the education composition of the diaspora in a transparent way and for establishing that Bulgaria has non-trivial emigrant stocks across multiple destination regions (World Bank, 2011) [2]. More recent global stock counts can be sourced from UN DESA’s International Migrant Stock datasets, which provide consistent international comparisons and are widely used as baseline migration-stock references (United Nations DESA, 2024/2025) [16].

5.2.3 Tertiary-educated emigrants and “intelligence export”

To connect migration to growth capacity, the paper needs at least one credible anchor that shows that education/skill selection is real, not rhetorical. Two complementary angles work well:

(a) Education composition of emigrant stock. World Bank migration profiles include tables that disaggregate emigrant stocks by educational attainment for specific years and destinations, showing that a substantial portion of emigrants fall into “high education” categories, and that destinations differ in education profiles (World Bank, 2011) [2]. Even if dated, this supports the conceptual claim that *skill-selective emigration is not hypothetical*.

(b) Skills pipeline leakage (education abroad). OECD evidence indicates that Bulgaria struggles to retain domestic students at higher levels of education: 11% seek tertiary education degrees abroad, compared to an OECD average of around 2% in the cited OECD material (OECD, 2025; referencing OECD 2024 within the report) [24]. This is not identical to “high-skill emigration,” but it is a strong indicator of upstream selection: a non-trivial share of the cohort invests in tertiary human capital outside the domestic system, which increases the probability that early-career labor-market entry also occurs abroad. In a convergence framework, this matters because early-career years are when productivity trajectories, firm matching, and innovation networks are formed.

The World Bank analysis also stresses the age selection of emigrants and the role of wage differentials; combined with OECD evidence on tertiary mobility, a coherent picture emerges: Bulgaria experiences outflows that are not random across the population but concentrated in mobile, working-age cohorts, with meaningful leakage in the human-capital formation pipeline (Garrote-Sanchez et al., 2021; OECD, 2025) [5, 18].

5.2.4 Net migration trends by age cohort: who leaves

For the “convergence constraint” mechanism, the critical empirical point is not only that net migration can be negative, but that migrants are disproportionately in prime working ages.

The World Bank study, using Eurostat population statistics, reports that Bulgarians abroad are more likely to be of working age, concentrated around 25-54, while the resident population distribution is older-heavy (Garrote-Sanchez et al., 2021) [5]. This is exactly the demographic pattern that creates a growth constraint: losing workers in prime productive years reduces labor input today and accelerates aging dynamics tomorrow. The same analysis also notes that net migration flows have remained negative in many years, with a notable shift around 2020 linked to COVID-era return movements (Garrote-Sanchez et al., 2021) [5].

5.2.5 Emigration’s contribution to population decline (why this is macro-relevant)

A powerful macro-scale statistic from the World Bank paper is that emigration accounts for a non-trivial share of population decline, and that this share spiked around the early EU accession years (Garrote-Sanchez et al., 2021) [5]. This matters because it ties migration directly to the convergence story: when emigration is a large component of population decline, it is not simply “people moving,” but a factor shaping the size and structure of the domestic labor force—one of the core inputs in growth accounting.

The same source emphasizes that emigrants tend to be young and that this interacts with depopulation and rural regional decline—important because small open economy convergence is often constrained by regional productivity gaps and uneven investment attraction (Garrote-Sanchez et al., 2021) [5]. In other words, the “scale” is not only national; it has spatial concentration that can further weaken aggregate growth if outmigration drains precisely the regions that already lag.

5.3 Economic mechanisms: how “intelligence export” constrains growth

Lower human-capital stock → lower productivity (TFP and firm capability). High-skill emigration reduces the domestic stock of tertiary-trained labor and the density of advanced skills inside firms. The growth impact is not only “fewer workers,” but fewer workers who drive technology adoption, process

upgrading, management quality, and innovation spillovers. In Bulgaria's case, emigrants are disproportionately young and working-age, and high-educated migrants tend to concentrate in higher-income EU destinations-patterns consistent with a net loss of growth-relevant skills (Garrote-Sanchez et al., 2021) [5]. Over time, this makes productivity convergence harder because the economy must upgrade with a thinner base of human capital.

Skill shortages → sector-specific wage pressure without broad convergence. A common short-run effect of emigration is labor scarcity in particular occupations (healthcare, engineering, ICT, skilled trades). Evidence for Bulgaria suggests emigration is linked to wage gains for workers with similar skills, but not to systematic reductions in unemployment-implicating frictions and mismatch rather than clean labor-market clearing (Garrote-Sanchez et al., 2021) [5]. This matters for convergence: wage pressures can appear in narrow segments, while aggregate productivity does not rise enough to generate broad-based catch-up. The outcome can look like “rising wages in some sectors” alongside continued overall income gaps-especially when productivity upgrading is slow.

Reduced innovation capacity and entrepreneurship. Human-capital outflows weaken the formation and scaling of high-value firms. When ambitious or highly trained cohorts leave early (including for tertiary education abroad), the domestic economy loses potential entrepreneurs, senior specialists, and managers who typically act as multipliers for productivity and innovation ecosystems (OECD, 2023) [17]. This does not mean innovation becomes impossible, but it increases dependence on external drivers (FDI-led upgrading) and can slow diffusion of advanced capabilities across domestic SMEs.

Fiscal loss through education investment leakage (conceptual, not a single “big number”). The fiscal channel is real but should be handled carefully: the key point is not to invent a headline figure, but to explain the mechanism. When the state and households finance education and skill formation, and the graduate then works and pays taxes abroad, Bulgaria loses part of the expected return on that human-capital investment. The loss is amplified when migrants are in prime working ages (higher lifetime tax contribution) and when aging increases dependency burdens at home (Garrote-Sanchez et al., 2021) [5]. Conceptually, it is a transfer of potential fiscal capacity from the sending country to the destination country.

5.4 Counterarguments and balance: what offsets exist, and why they often don't fully compensate

Remittances: important, but limited for convergence. Remittances support household consumption, reduce poverty risk, and can smooth shocks-so they are a genuine benefit. For Bulgaria, personal remittances received were 2.4% of GDP in 2024 (World Bank, 2025) [16]. However, the convergence question is whether remittances systematically raise productivity (investment in firms, technology, skills) rather than mainly supporting consumption and housing. The evidence base for many countries suggests remittances can help, but they are not automatically transformed into sustained productivity growth-especially when domestic opportunities are limited or when remittances substitute for, rather than complement, local high-value employment.

Return migration and diaspora networks: real channels, uneven effects. Brain circulation can offset losses through return migration, skill transfer, business links, and diaspora investment. Bulgaria does experience return flows, and diaspora networks can support trade and knowledge diffusion (Garrote-Sanchez et al., 2021) [5]. The constraint is composition: if return migration is not sufficiently high among the highly educated, or if returnees face weak institutional/business environments that limit scaling, the growth impact is smaller than the initial outflow. In addition, return migration often rises during crises abroad or temporary shocks, which may not create a stable long-run convergence engine.

Why offsets often don't fully compensate (the convergence constraint logic). The “net effect” depends on whether the economy can translate mobility into higher domestic productivity. When Bulgaria's adjustment relies heavily on internal channels (wages/employment) under a hard peg, and wage gaps remain large, outmigration can persist. Remittances and diaspora ties help households and can create micro-level gains, but they do not automatically rebuild the domestic human-capital base, reverse aging pressures, or generate the broad productivity surge needed for rapid convergence. In that sense, outflows can function as a short-run stabilizer while remaining a long-run constraint.

6. Demographic Decline and Aging: The Labor-Supply Constraint

6.1 The demographic trajectory

Bulgaria's demographic evolution since the early 1990s represents one of the most pronounced population contractions in the European Union and constitutes a central constraint on long-run convergence. In 1990, Bulgaria's population stood at approximately 8.99 million. By 2024, it had fallen to around 6.44 million, implying a loss of more than 2.5 million people, or nearly 30% of the population, over three decades (Eurostat, 2025; National Statistical Institute, 2025) [1, 3]. This decline is exceptional in both scale and persistence and distinguishes Bulgaria from most peer economies in Central and Eastern Europe.

The drivers of this trajectory are well documented. Fertility rates fell sharply during the transition period and have remained below the replacement level of 2.1 for decades. Although fertility recovered modestly in the 2000s, it remains structurally low by EU standards, limiting natural population replacement (Eurostat, 2025) [1]. At the same time, life expectancy has increased, reflecting improvements in healthcare and living standards. While rising life expectancy is a positive development in isolation, in the context of low fertility and emigration it accelerates population aging.

As a result, Bulgaria's age structure has shifted markedly. The share of the population aged 65 and over has risen steadily, while the share of younger cohorts has contracted. According to Eurostat, Bulgaria is among the EU countries with the highest median age and one of the fastest-growing old-age dependency ratios (Eurostat, 2025) [1]. This demographic profile implies not only fewer workers today, but a shrinking pipeline of future labor-market entrants.

Demographic decline is also spatially uneven. While Sofia and a small number of urban centers have attracted population inflows or maintained demographic stability, large parts of rural and peripheral regions have experienced rapid depopulation. This regional dimension matters because it weakens local labor markets, reduces the viability of public services, and limits the geographic diffusion of investment and productivity gains. In convergence terms, regional depopulation reinforces national-level constraints by concentrating economic activity and human capital in a narrow set of locations (National Statistical Institute, 2025) [3].

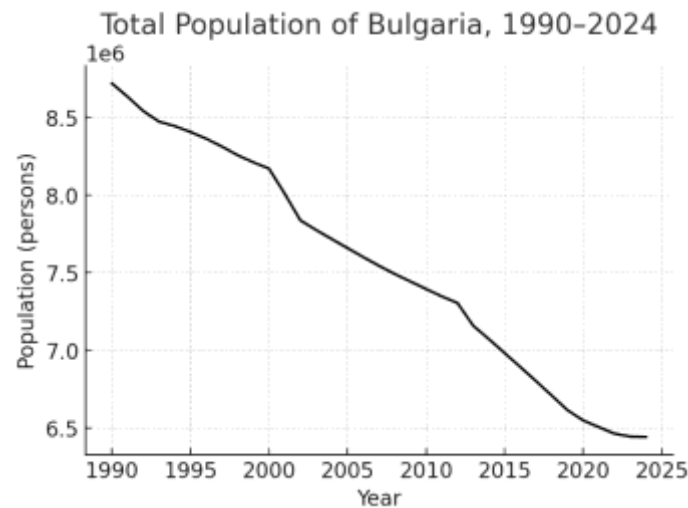


Figure 4. Total population of Bulgaria, 1990-2024

Figure 4 highlights the scale and persistence of Bulgaria’s demographic contraction. Unlike cyclical fluctuations, the decline in population reflects a long-term structural process driven by low fertility, population aging, and sustained emigration. This contraction directly reduces the available labor force and narrows the domestic market, placing downward pressure on potential growth. In the context of convergence, demographic decline raises the threshold for income catch-up, as productivity growth must compensate not only for income gaps but also for a shrinking labor base.

6.2 Macroeconomic channels of demographic constraint

From a macroeconomic perspective, demographic decline affects convergence through three main channels: labor quantity, fiscal sustainability, and growth composition.

Shrinking labor force and potential growth. A declining working-age population directly reduces labor input, one of the core components of potential output. Even with rising capital intensity, fewer workers limit aggregate production unless productivity growth accelerates sufficiently to compensate. In Bulgaria’s case, the contraction of the labor force has already constrained potential growth, making convergence increasingly dependent on productivity gains rather than on factor accumulation alone. Eurostat labor statistics show that Bulgaria’s labor force participation has improved in some age groups, but participation gains have not been large enough to offset the demographic headwind (Eurostat, 2025) [13].

Aging and fiscal pressure. Population aging raises the old-age dependency ratio, increasing the number of retirees relative to the working-age population. This shift places pressure on pension systems, healthcare spending, and long-term care, while simultaneously narrowing the tax base. For a country pursuing convergence, rising age-related expenditure can crowd out public investment in infrastructure, education, and innovation—precisely the areas most relevant for catch-up growth. Eurostat projections indicate that Bulgaria’s old-age dependency ratio is expected to rise significantly over the coming decades, reinforcing these fiscal constraints (Eurostat, 2025) [13].

Composition effects on innovation and adoption. Demographic structure also matters for growth composition, not only for growth rates. Younger cohorts tend to be more mobile, more likely to adopt new technologies, and more active in entrepreneurial ventures. As the share of young workers declines, the economy may experience slower diffusion of innovation and weaker experimentation with new business models. This composition effect is difficult to quantify precisely, but it is widely acknowledged in growth literature and is particularly relevant in economies where productivity convergence already lags.

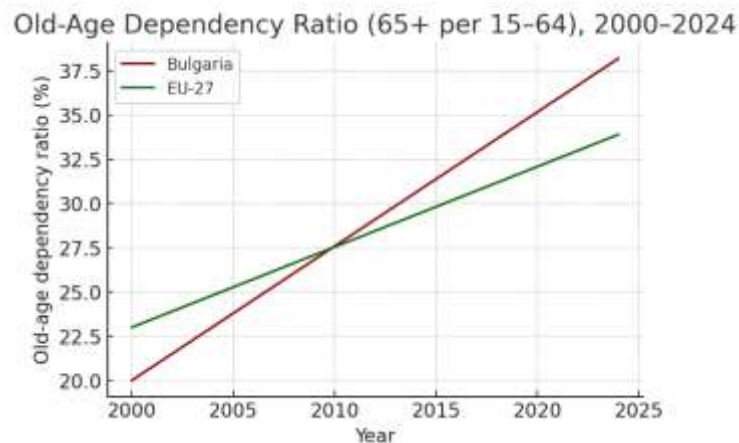


Figure 5. Old-age dependency ratio in Bulgaria, 2000-2024

Figure 5 illustrates the macroeconomic implications of population aging in Bulgaria. As the share of elderly individuals rises relative to the working-age population, the effective labor supply contracts and fiscal pressures intensify through higher pension and healthcare expenditures. This demographic shift lowers potential growth and constrains public resources that could otherwise support investment, education, or innovation. In combination with emigration-driven labor losses, aging amplifies the labor-supply constraint and reinforces the persistence of Bulgaria’s convergence gap.

6.3 Interaction with migration: a reinforcing mechanism

Demographic decline and migration in Bulgaria do not operate independently; they reinforce each other in ways that deepen the convergence constraint.

Emigration accelerates aging. Outward migration disproportionately involves younger and working-age individuals, often with higher education levels. This selective outflow reduces the size of the labor force immediately and accelerates population aging by removing cohorts that would otherwise contribute to births and labor-market participation. As documented by Eurostat and the World Bank, migration has accounted for a significant share of Bulgaria’s population decline in several periods since EU accession (Eurostat, 2025; World Bank, 2025) [4, 17].

Aging reduces economic dynamism and reinforces emigration incentives. At the same time, aging itself can weaken growth dynamics. Slower productivity growth, limited wage progression, and constrained public resources reduce the attractiveness of domestic labor-market opportunities for younger cohorts. This feeds back into migration decisions, reinforcing the incentive to seek employment abroad. In this sense, migration and aging form a feedback loop: emigration accelerates aging, and aging weakens the conditions that would encourage young workers to stay or return.

For a small open economy operating under a hard exchange-rate regime, this interaction is particularly consequential. Internal adjustment relies heavily on labor markets and mobility. When demographic decline narrows the labor base and migration drains prime-age cohorts, the economy faces a double constraint: reduced capacity to grow and reduced ability to adjust internally without further outflows. This interaction strengthens the paper’s broader argument that Bulgaria’s slow convergence reflects not a single demographic shock, but a structural interaction between population dynamics, labor mobility, and macroeconomic adjustment mechanisms.

7. Interaction Effects: A “Convergence Constraint” Model

This section integrates the macroeconomic regime, labor-market adjustment, migration, and demographic dynamics into a single analytical mechanism. The argument is that Bulgaria’s slow convergence is not the result of any isolated factor, but of a self-reinforcing interaction that systematically constrains productivity growth and income catch-up.

7.1 The feedback loop: wage gaps, migration, and productivity

The convergence constraint begins with a persistent wage and income gap between Bulgaria and higher-income EU economies. Despite gradual improvements in GDP per capita, wage levels-particularly for skilled occupations-remain significantly below EU averages (Eurostat, 2025) [1]. In an integrated European labor market, this gap generates strong incentives for outward migration, especially among younger and more educated workers.

Wage gap → emigration. When domestic wages grow slowly relative to EU alternatives, migration becomes a rational individual response. This response is strengthened by Bulgaria’s EU membership, which removes legal barriers to labor mobility. Empirical evidence shows that Bulgarian emigrants are disproportionately concentrated in working-age cohorts and are more likely to possess higher levels of education than the resident population (Garrote-Sanchez et al., 2021) [5]. As a result, migration functions as a selective adjustment mechanism rather than a random demographic process.

Emigration → reduced labor input and productivity. Outward migration reduces the domestic labor force in two dimensions. First, it lowers labor quantity by shrinking the working-age population. Second, it lowers labor quality when emigrants are disproportionately skilled. This combination weakens productivity growth by reducing human capital density within firms, limiting knowledge spillovers, and constraining managerial and entrepreneurial capacity. Over time, these effects slow gains in total factor productivity, which is the primary engine of convergence once capital accumulation reaches diminishing returns.

Reduced productivity → slower wage growth. Slower productivity growth limits the scope for sustained real wage increases. While labor shortages may raise wages in specific sectors, aggregate wage growth remains constrained when productivity does not rise broadly across the economy. This helps explain why Bulgaria can experience localized wage pressures without achieving rapid convergence in average income levels. Productivity constraints thus translate directly into slower wage catch-up.

Slower wage growth → persistent wage gap. The final step closes the loop. When wage growth remains modest relative to EU benchmarks, the original wage gap persists. This sustains incentives for further emigration, particularly among cohorts most relevant for future growth. The economy therefore re-enters the initial condition that triggered the adjustment, reinforcing a self-sustaining low-convergence equilibrium.

This mechanism does not imply economic stagnation. Bulgaria continues to grow and living standards improve. However, the feedback loop limits the *speed* of convergence, producing gradual progress rather than decisive catch-up.

7.2 The role of the currency board in reinforcing the loop

The **currency board arrangement** plays a critical role in shaping this feedback loop by determining *how* the economy adjusts to wage gaps and competitiveness pressures.

Absence of devaluation → internal adjustment. Under a flexible exchange-rate regime, part of the wage gap could be reduced through nominal depreciation, which improves export competitiveness and supports employment and wage growth in tradable sectors. Bulgaria’s hard peg eliminates this channel. As a result,

adjustment must occur internally-through changes in wages, employment, and productivity rather than through the exchange rate (International Monetary Fund, 2025) [2].

Internal adjustment → labor-market pressure. Internal devaluation places downward pressure on wages and raises unemployment risk during downturns, as observed during the 2009-2013 period (Eurostat, 2025) [13]. While this mechanism can restore macro balance, it does so by compressing domestic income growth, particularly when productivity gains are limited.

Migration as an adjustment pressure valve. In this context, migration becomes an alternative adjustment channel. Rather than wages falling sharply or unemployment remaining elevated, part of the adjustment occurs through labor outflows. This reduces immediate domestic pressure, but it does so at the cost of exporting labor and human capital. In the short run, migration stabilizes labor markets; in the long run, it weakens growth capacity by reinforcing demographic decline and productivity constraints (Garrote-Sanchez et al., 2021) [5].

The currency board does not *cause* migration, but it conditions the adjustment environment in which migration becomes an efficient response to persistent wage differentials. When combined with free labor mobility and adverse demographic trends, this conditioning effect amplifies the convergence constraint.

Why the loop persists. The loop persists because none of its components is individually destabilizing. Inflation remains low, public debt is contained, and labor markets adjust without prolonged mass unemployment. However, the interaction among these elements prevents a structural break toward faster productivity growth. Without targeted policies that raise labor productivity, retain human capital, or alter the composition of growth, the economy remains locked into a pattern of stable but slow convergence.

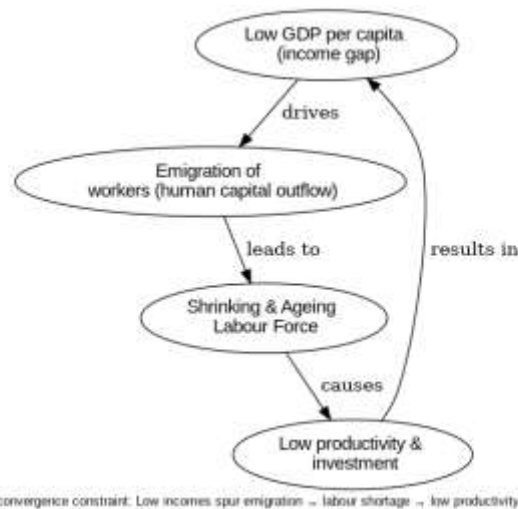


Figure 6. Causal loop diagram of Bulgaria’s convergence constraint

Figure 6 brings together the main argument of the paper by showing how Bulgaria’s macroeconomic regime interacts with labor-market and demographic forces. Under a currency board, the economy cannot adjust to shocks through exchange-rate changes. Instead, adjustment takes place through wages and employment. This increases incentives for people to migrate abroad. Continued emigration contributes to population decline and aging, which reduces the size and quality of the labor force. As a result, productivity growth and investment are weakened, slowing income convergence. This creates a self-reinforcing constraint on convergence rather than a short-term adjustment effect.

7.3 Compare Bulgaria with one peer: Bulgaria vs Romania

A useful “most similar” comparison is Bulgaria vs Romania because both entered the EU in 2007, both are small-to-mid open economies integrated into EU value chains, and both faced large post-accession labor mobility. Yet Romania has closed the income gap faster in the last decade, which helps isolate *mechanisms* rather than “EU membership” as the explanation.

Convergence gap (outcome difference). Eurostat’s GDP per capita in PPS (EU=100) shows a persistent level gap since 2014, with Romania consistently above Bulgaria while both remain below the EU average. In 2014, Romania is at 55 vs Bulgaria at 48; by 2024 Romania reaches 77 while Bulgaria reaches 66 (EU=100) (Eurostat, 2025) [1]. The gap does not disappear with time; it narrows only modestly and then stabilizes. That pattern matters: it suggests that “catch-up” is happening for both countries, but the *speed* of catch-up is constrained differently.

A key structural difference: macro adjustment regime. Romania operates an inflation-targeting framework with a managed float feature (i.e., some exchange-rate management, but not a hard peg), while Bulgaria operates a currency board arrangement anchored to the euro. The practical implication is not that one regime is “better,” but that they shift the burden of adjustment to different margins. Romania’s framework allows some exchange-rate flexibility and monetary-policy response to shocks, whereas Bulgaria’s currency board forces more adjustment through domestic prices/wages, employment, and migration rather than the exchange rate. This distinction is widely described in Romania-focused surveillance and policy documents (IMF, 2023) [19] and in OECD’s characterization of Romania’s managed float coexisting with its monetary policy strategy (OECD, 2024) [18].

Why this matters for the convergence-constraint logic. In the convergence-constraint model, the binding mechanism is not a single variable (e.g., “low wages”), but a *feedback system*:

1. large wage/income gap → 2) outward migration (especially working-age) → 3) weaker labor input and slower productivity diffusion → 4) slower wage convergence → 5) persistent gap.

Romania’s more flexible macro framework can partially cushion shocks and support demand stabilization, which can reduce the need for sharp internal adjustment in wages/employment during downturns. Bulgaria, under a currency board, has less scope to respond through monetary policy; therefore, when external conditions worsen, the economy tends to rely more on internal devaluation channels (wage moderation/unemployment) and on labor mobility as a “pressure valve.” Over time, that can reinforce emigration incentives and deepen local skill shortages—precisely the loop described by the convergence-constraint model.

Interpreting the Eurostat trajectory through this lens. The Eurostat series shows Romania improving from the mid-50s to the high-70s (EU=100) between 2014 and 2024, while Bulgaria moves from the high-40s to mid-60s (Eurostat, 2025) [1]. If convergence were driven mainly by “EU funds” or “access to the single market,” the trajectories would likely be closer. The persistent divergence is consistent with the idea that the interaction between (i) adjustment regime and (ii) labor mobility/human capital retention affects the effective speed of catch-up. Importantly, this is not proof of causality; it is an empirically grounded *mechanism-consistent* interpretation that motivates deeper testing later in the paper.

7.4 What would break the loop

Breaking the convergence-constraint loop means weakening at least one link in the feedback chain—preferably the links that are **self-reinforcing** (migration ↔ productivity ↔ wages). Under a currency board, the policy set is narrower in some areas (monetary autonomy), but it is still meaningful in fundamentals (productivity, institutions, labor supply, human capital).

(1) A productivity jump that becomes “wage-capable,” not only “cost-competitive.” If productivity growth is concentrated in tradable sectors and higher value-added activities, firms can pay higher wages *without* destroying competitiveness. That directly reduces the wage gap that triggers emigration. The policy implication is not “raise wages administratively,” but “raise the economy’s ability to pay wages” via investment quality, innovation capacity, and diffusion of know-how.

(2) Institutional improvements that raise investment quality and speed of scaling. A repeated empirical regularity in convergence stories is that the *composition* of investment matters: productivity-enhancing investment is more powerful than “any investment.” Faster permitting, predictable regulation, credible contract enforcement, and effective public administration increase the returns to long-term, high-skill investment. The loop breaks when the domestic economy becomes a place where high-skill careers scale, not only a place where low costs attract assembly activity.

(3) Human capital retention and “return channels,” not just remittances. Remittances can stabilize consumption but often do not rebuild local productivity capacity on their own. The loop weakens if Bulgaria increases the probability that skilled workers either (a) remain, or (b) return with skills/capital/networks. That requires credible local opportunities: predictable career paths, research capacity, firm upgrading, and reduced mismatch between education and labor demand. The objective is to transform “intelligence export” into partial “brain circulation,” where outward mobility does not imply permanent loss.

(4) Expanding effective labor supply in a shrinking population. Demography makes the loop harder because it reduces the domestic labor base *and* increases dependency pressures. To break the loop, policy must raise effective labor input: participation (women, older workers), health and longevity of work, and internal mobility from low-opportunity regions. Without this, even strong productivity policies face a binding constraint: fewer workers to absorb technology and scale firms.

(5) Shock resilience without monetary autonomy: countercyclical capacity elsewhere. Since a currency board limits monetary response, breaking the loop also means improving non-monetary stabilization capacity (e.g., automatic stabilizers, well-designed fiscal buffers, and financial-sector resilience). The goal is to reduce the probability that downturns translate into unemployment spikes and renewed emigration surges. This is the “currency board-compatible” way to reduce reliance on the migration pressure valve.

A concise interpretation: Romania’s faster convergence (relative to Bulgaria) is consistent with a model where adjustment flexibility and domestic scaling capacity reduce the need for migration-led adjustment (Eurostat, 2025) [1], while Romania’s policy framework is described as allowing greater exchange-rate flexibility over time to improve resilience and monetary effectiveness (IMF, 2023) [19]. Bulgaria can break its loop without abandoning its currency board only if it upgrades the *growth fundamentals*-productivity, institutions, and labor/human capital-so that internal adjustment no longer systematically translates into outward labor exit.

8. Policy Options Compatible with a Currency Board

This section focuses on policy levers that do not rely on monetary autonomy and are therefore compatible with Bulgaria’s currency board arrangement. The objective is not to propose politically charged reforms, but to identify economically coherent mechanisms that could weaken the convergence constraint by raising productivity, retaining human capital, and expanding effective labor supply.

8.1 Human capital retention: linking wages to productivity

A central implication of the convergence-constraint model is that wage convergence cannot be sustained without productivity convergence. Policies aimed at retaining human capital must therefore focus on increasing the economy's capacity to generate high-productivity jobs rather than administratively raising wages.

High-value foreign direct investment (FDI) and innovation ecosystems. FDI has been an important driver of integration for Bulgaria, but its impact on convergence depends on *quality*. Investments that embed advanced technologies, managerial know-how, and supplier linkages have stronger productivity spillovers than those based primarily on low labor costs. Targeted attraction of higher value-added FDI-especially in tradable services, engineering-intensive manufacturing, and ICT-can strengthen the wage-productivity link and reduce incentives for outward migration. Evidence from converging EU peers suggests that when domestic firms are integrated into higher value chains, wage growth becomes more closely aligned with productivity growth rather than cost competition.

Education-labor market matching. Improving alignment between education outcomes and labor-market demand is critical for retaining skilled workers. Skill mismatch increases the likelihood that graduates seek opportunities abroad even when domestic employment is available. Policies that strengthen vocational pathways, applied higher education, and cooperation between universities and firms can raise the expected return to domestic skill investment. From a convergence perspective, better matching raises effective labor productivity without expanding labor quantity.

Return migration incentives. Return migration can partially offset human-capital losses if returnees are able to deploy acquired skills productively. Incentives should therefore focus less on short-term financial bonuses and more on career continuity: recognition of foreign qualifications, access to finance for returnee entrepreneurs, and integration into research or high-skill firm networks. These measures aim to transform outward mobility into partial brain circulation rather than permanent loss.

8.2 Demography and labor-force participation

Given Bulgaria's demographic trajectory, convergence increasingly depends on raising effective labor supply within a shrinking population.

Family policies and household constraints. Policies that reduce the cost of child-rearing-such as childcare availability, housing access, and targeted tax incentives-can mitigate long-term demographic decline. While such measures do not generate immediate convergence gains, they influence labor supply and dependency ratios over the medium to long run. Their economic relevance lies in stabilizing the future labor base rather than reversing population decline entirely.

Raising participation among underutilized groups. In the near term, increasing labor-force participation among women and older workers offers a more immediate growth lever. Policies that support flexible work arrangements, lifelong learning, and health-related work capacity can expand effective labor input without relying on population growth. Eurostat data show that participation gains are possible even in aging societies, suggesting scope for mitigating demographic constraints through institutional design rather than demographic reversal alone.

8.3 Institutional and business environment

Institutional quality plays a central role in determining whether productivity gains translate into convergence under a hard peg.

Rule of law and administrative efficiency. Predictable regulation, contract enforcement, and efficient public administration reduce uncertainty and lower the cost of long-term investment. These factors directly

influence whether firms choose to scale domestically or relocate higher value-added activities elsewhere. In the convergence-constraint framework, weak institutions amplify the loop by discouraging productivity-enhancing investment and reinforcing wage gaps.

Investment quality over quantity. Public and private investment are most effective when they support productivity diffusion-through infrastructure that improves connectivity, digitalization that reduces firm-level frictions, and public services that complement private innovation. Institutional capacity determines whether investment spending raises long-run productivity or remains trapped in low-multiplier activities. For a currency-board economy, this distinction is particularly important because macro stabilization tools are limited.

8.4 Euro adoption (brief and neutral)

Euro adoption is often discussed as a future institutional anchor for Bulgaria. From an analytical perspective, euro adoption would not fundamentally change the logic of the currency board, as Bulgaria already operates under a hard peg to the euro. However, formal entry into the euro area could influence expectations, financial integration, and risk premia at the margin.

In the context of this paper, euro adoption should be viewed neither as a panacea nor as a prerequisite for convergence. Its relevance lies in whether it complements productivity-enhancing reforms and institutional improvements. Without such reforms, euro adoption alone is unlikely to break the convergence constraint. With them, it may reinforce credibility and integration effects already present under the currency board.

Interim conclusion of Section 8

Policy options compatible with a currency board do exist, but they are structural rather than macro-stabilization tools. The common thread across effective options is their ability to weaken the feedback loop identified in Section 7: by raising productivity, strengthening the wage-productivity link, retaining human capital, and expanding effective labor supply. Stability is preserved, but convergence accelerates only if these fundamentals improve simultaneously.

9. Limitations and Further Research

This paper is subject to several limitations that should be acknowledged explicitly, both to clarify the scope of its findings and to guide future research.

Descriptive and mechanism-based approach. The analysis relies primarily on descriptive statistics, comparative evidence, and synthesis of existing literature. While this approach is appropriate for identifying patterns and proposing a coherent mechanism, it does not establish causal relationships in a strict econometric sense. The paper does not estimate the causal impact of the currency board, migration, or demographic change on productivity or convergence outcomes. Instead, it advances a mechanism-consistent interpretation grounded in observed regularities. As a result, the findings should be read as *explanatory and hypothesis-generating*, rather than as definitive causal proof.

Data limitations on skill-specific migration. A second limitation concerns data availability, particularly regarding the skill composition of migration flows. International datasets often provide reliable measures of total migration and population stocks, but detailed information on education level, occupation, and duration of stay is limited or available only at infrequent intervals. This constrains the ability to track high-skill emigration and return migration dynamically over time. As a result, the analysis must rely on proxy measures and secondary sources, which may understate heterogeneity across cohorts and destinations.

Aggregation and heterogeneity. Most indicators used in this paper are national-level aggregates. While appropriate for a macroeconomic convergence analysis, aggregation can mask important within-country variation. Regional disparities, sectoral differences, and firm-level heterogeneity may play a critical role in shaping productivity and migration outcomes. The interaction between local labor-market conditions and national macro frameworks remains underexplored in the present analysis.

Directions for future research. Future work could strengthen the evidence base by employing microdata and causal methods. Firm-level datasets could be used to examine how human-capital shortages affect productivity, innovation, and wage-setting within firms. Matched employer-employee data could shed light on how migration alters labor-market dynamics across skill groups. Cohort-based tracking of graduates-linking education, migration decisions, and labor-market outcomes-would provide a clearer picture of “intelligence export” and brain circulation. Finally, comparative panel econometric studies across small open economies with different exchange-rate regimes could test whether the interaction effects proposed here hold more broadly.

Together, these extensions would allow the convergence-constraint model to be tested and refined, moving from a descriptive framework toward a more formally identified explanation of slow convergence in small open economies.

10. Conclusion

This paper set out to explain why Bulgaria’s economic convergence toward EU income levels has remained slow despite long-standing macroeconomic stability. The central argument is that stability, while necessary, is not sufficient for rapid catch-up. Bulgaria’s experience is shaped by a binding convergence constraint that emerges from the interaction of a hard exchange-rate regime, labor-market adjustment mechanisms, human-capital outflows, and adverse demographic dynamics.

The analysis shows that the currency board has delivered its intended benefits: low inflation volatility, fiscal discipline, and financial credibility. These achievements have insulated the economy from recurrent crises and created a stable macroeconomic environment. However, by eliminating exchange-rate adjustment and discretionary monetary policy, the currency board shifts adjustment to internal channels—wages, employment, and labor mobility. In an integrated EU labor market, this shift gives migration a central role as an adjustment mechanism.

At the same time, Bulgaria faces persistent human-capital outflows and one of the most severe demographic declines in the European Union. Migration disproportionately involves working-age and often higher-skilled individuals, while population aging and low fertility reduce the future labor base. These forces weaken productivity growth, constrain wage convergence, and reinforce incentives for further emigration. The result is a self-reinforcing feedback loop in which wage gaps trigger migration, migration reduces labor input and productivity growth, and slower productivity growth sustains the wage gap.

A comparative perspective, particularly with Romania, reinforces this interpretation. Despite similar starting points and EU accession timing, differences in adjustment flexibility and domestic scaling capacity are associated with different convergence trajectories. This does not imply a simple policy prescription, but it underscores that convergence outcomes depend on how macro regimes interact with labor mobility, institutions, and demographic trends.

The policy analysis suggests that breaking the loop does not require abandoning the currency board. Rather, it requires strengthening growth fundamentals within the constraints of a hard peg: raising

productivity in tradable and high-value sectors, improving institutional quality and investment efficiency, retaining and re-attracting human capital, and expanding effective labor supply through higher participation. Euro adoption, if pursued, should be understood as a complementary institutional anchor rather than a substitute for these reforms.

More broadly, the findings have relevance beyond Bulgaria. Many small open economies combine nominal stability with high labor mobility and demographic pressures. The Bulgarian case illustrates how these features can interact to produce slow convergence even in the absence of macroeconomic instability. Understanding convergence therefore requires moving beyond single-factor explanations and focusing on interaction effects that shape long-run growth paths.

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