The True Wealth of Greece: An Inclusive Wealth assessment from 1990 to 2020 within the EU Sustainability Agenda

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Abstract:

The present report assesses the Greek inclusive wealth over 1990–2020 using the Inclusive Wealth Index (IWI), decomposing human, produced, and natural capital and benchmarking against the EU-28. The results show that the produced capital expanded markedly but plateaued after the financial crisis of 2008. Furthermore, the human capital per capita remains ~46% below the EU average, reflecting gaps in education, ICT and managerial skills, labour productivity, and the effects of brain drain and regional disparities. Essentially, the natural capital has been pressured by biodiversity loss, deforestation, marine pollution, and limited circular-economy uptake. Overall, these dynamics place Greece in the lower-middle tier of EU countries for inclusive wealth, therefore, the report outlines priorities to close the gap. The proposed policies target, one the one hand on human capital, by strengthening tertiary and vocational pathways, fostering innovation and university and industry linkages, expanding female employment, enhancing ICT skills, and rebuilding institutional trust. On the other hand on natural capital, through strategies on sustainable forest and land management, marine ecosystem protection, circular-economy incentives, and recognition of socio-cultural ecosystem services to support conservation and eco-tourism. To conclude, the improvement of human and natural capitals is pivotal for long-term wellbeing, intergenerational equity, and alignment with the EU sustainability agenda.

Key Words: inclusive wealth; beyond GDP; sustainable development; Greece

JEL Codes: Q01, Q56, E01, O44

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1. Introduction

The Beyond GDP era emerged after the decline of the Fordic model, which enabled state interventions in markets and stable employment but also contributed to a series of crises, including environmental degradation and inflation across the USA and Europe during the 1960s–1980s (Antonio & Bonanno, 2000; Jessop, 1995). Zolotas (1981) described this post-war optimism as a form of "growth-mania" that intensified the depletion of natural resources and the pressures on ecosystems.

This trajectory is linked to the linear "take-make-dispose" economy, in contrast to the circular economy model that seeks to retain resources within the value chain for longer periods (Halkos & Aslanidis, 2024a; Stahel, 2019). However, mass consumption exacerbated waste flows and threatened the Earth's carrying capacity, leading to a dual challenge: on one hand, stagnating global productivity, and on the other, rising demand that could equate to the use of three planets' worth of resources by 2050 (Esposito et al., 2015; Halkos & Aslanidis, 2023, 2024b).

Within environmental economics, a key debate concerns the substitutability of natural, human, and man-made capitals (Dasgupta, 2021; Halkos et al., 2025). Proponents of weak sustainability argue for substitutability across forms of capital (Solow-Hartwick framework), while advocates of strong sustainability emphasize the non-substitutable nature of "critical natural capital," which is irreplaceable, multifunctional, and vital for ecosystem stability (Andersen, 2006; Dasgupta, 2008; Gutés, 1996; Mancebo, 2013; Neumayer, 2013; Ott & Thapa, 2003; Payeur-Poirier & Nguyen, 2017; Victor et al., 1994). These perspectives reflect ecological, economic, managerial, psychological, and ethical dimensions.

The present report situates these debates in the context of novel indicators such as the Inclusive Wealth Index (IWI), which integrates natural, human, and produced capital to assess long-term wellbeing and sustainability. It compares EU-wide trends with the specific case of Greece, given its environmental vulnerabilities and economic challenges.

2. Historic importance of GDP

Sustainable development emphasizes intra- and inter-generational equity, aiming for policies that balance social well-being, economic progress, and environmental resilience (WCED, 1987). Traditionally, GDP has been the dominant measure of economic activity, institutionalized during the interwar period and promoted after WWII through the Bretton Woods system. However, GDP has long been criticized for its narrow focus on market output, neglecting social welfare, non-market activities, and environmental degradation (Costanza et al., 2009; Dornbusch et al., 2011; Kuznets, 1934; Mankiw, 2019). This has spurred the development of "Beyond GDP" indicators.

The IWI, introduced in the 2012 UNEP Inclusive Wealth Report, provides a more comprehensive framework by integrating produced, human, and natural capital, thereby offering a long-term perspective on sustainability and intergenerational equity (Arrow et al., 2003a, 2003b; Cheng et al., 2022; Dasgupta, 2001, 2014; Dasgupta & Mäler, 2000; Managi & Kumar, 2018; UNEP, 2023). Empirical evidence shows declines in natural capital, particularly in low-income nations, underscoring the importance of inclusive wealth in policy design (Dasgupta et al., 2022; Halkos et al., 2018; Managi et al., 2024). Recent reviews emphasize institutional reforms, biodiversity conservation, green labour markets, and innovation as key

emerging trends (Kousar et al., 2025). Overall, the IWI provides policymakers with a practical tool to align strategies with the SDGs, the Paris Agreement, and EU's Green Deal, promoting long-term well-being, ecological stability, and sustainable development.

3. Materials and Methods

The inclusive wealth framework extends welfare and utility theory by linking social well-being to the productive base of natural, human, and produced capital (Agliardi et al., 2012; Arrow et al., 2003a, 2003b; Dasgupta, 2001, 2014; Dasgupta & Mäler, 2000; Irwin et al., 2016). According to UNEP (2023), intergenerational welfare maximization, *V(t)*, is based on consumption, demographic change, and natural resource use. Welfare is expressed through the utility of consumption discounted over time, while the IWI formalizes the relationship between capital stocks and long-term sustainability:

$$IWI = r(t) + p_N \Delta N(t) + p_H \Delta H(t) + p_M \Delta M(t)$$

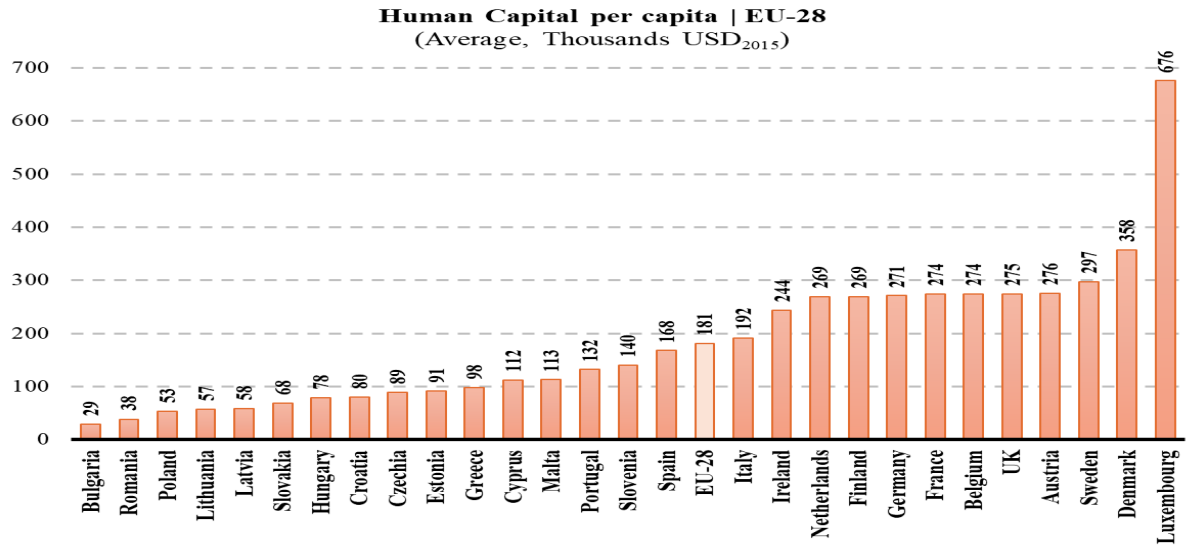
where $r(t)$ denotes the shadow price of time, and p_i (t) represents the shadow prices of natural, human, and produced capital. These shadow prices function as weights reflecting the social value of each form of capital (UNEP, 2023).

Although the linear form of the IWI appears to imply perfect substitutability among capitals, the wealth–welfare equivalence theorem stresses that substitution possibilities are limited (Gravelle & Rees, 2004). This links to the weak versus strong sustainability debate, particularly the irreplaceability of critical natural capital.

The adjusted IWI incorporates exogenous factors influencing wealth trends: (i) population change, (ii) transnational externalities such as greenhouse gas emissions, (iii) total factor productivity, and (iv) trade externalities of natural capital, notably oil price fluctuations. UNEP (2023) applies both IWI and adjusted IWI to EU-28 countries for the period 1990–2020, expressed in constant 2015 USD, offering insights into regional sustainability trajectories.

4. Capital Stock trends in Greece

Across the EU-28 in Figure 1, capital stocks per person show clear and different patterns. Initially, human capital averages 181k (in USD 2015 prices), with Luxembourg (676k), Denmark (358k), Sweden (297k), and Austria (276k) far ahead, while Bulgaria (29k), Romania (38k), Poland (53k), and Hungary (67k) sit at the bottom. Produced capital averages 100k, led by Luxembourg (263k), Sweden (185k), and Austria (178k), with Poland (23k), Romania (16k), and Bulgaria (11k) trailing. Furthermore, natural capital tells a different story, as the EU average is 17k, topped by Denmark (114k), Ireland (51k), and Sweden (36k), while Belgium (0.4k), Cyprus (2k), and Malta (2k) are lowest. Especially, the Greek human capital is 98k, about 46% below the EU average, placing it in the lower-middle tier countries.



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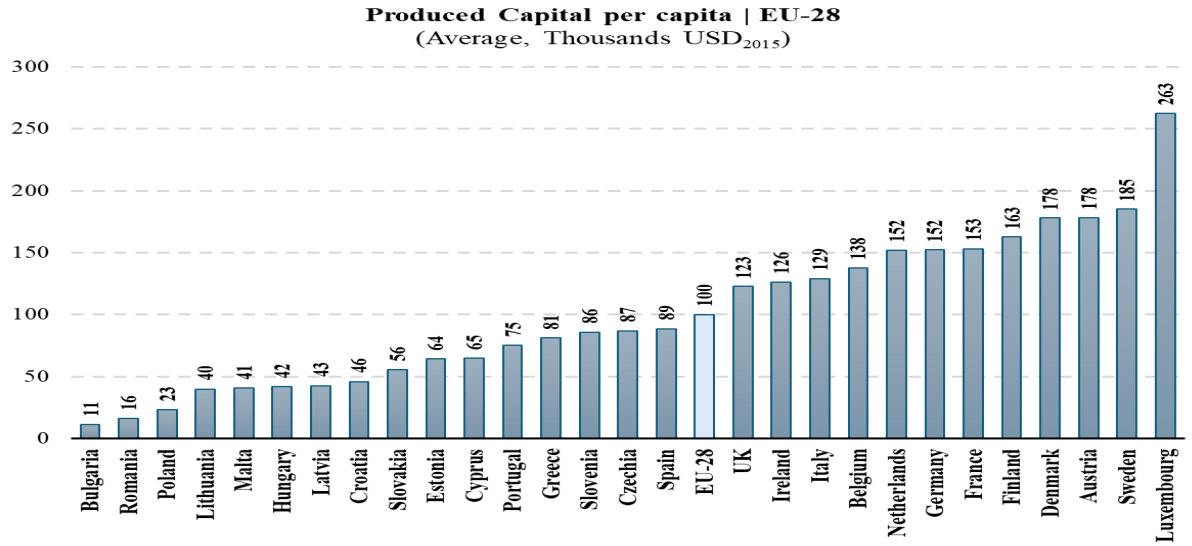

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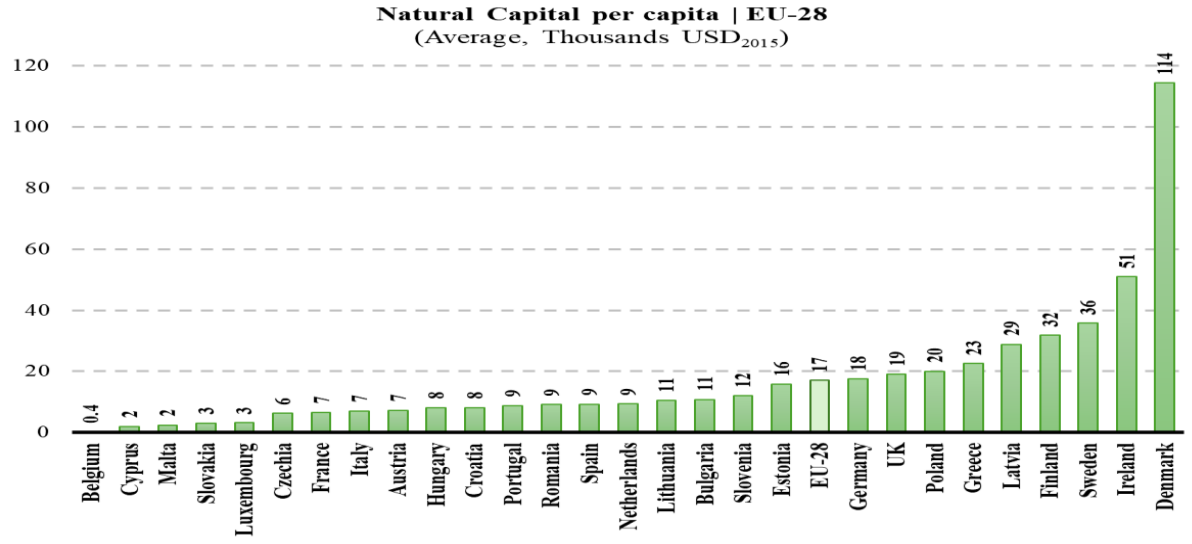

(c)

Figure 1. Average human, produced, and natural capital per capita in EU-28 (1990-2020).

Since 1990, Greece's produced capital per capita rose steadily and fast, surpassing by about +40% by the mid-2000s and peaking around +50% circa 2009–2012, then largely plateaued through 2020, signaling limited net accumulation after the crisis. Moreover, human capital also climbed, though more gradually, reaching roughly +40–45% by 2007–2011, dipping slightly around 2012–2015, and ending near the mid-40s by 2020, evidence of continued, if slower, gains in skills and education. In sharp contrast, the natural capital has declined persistently during the studied period, sliding to about –25% by the late 2000s and stabilizing near –30% thereafter. Overall, the growth model leaned on built assets and human skills while natural assets eroded, and post-crisis investment fatigue left produced capital growth flat.

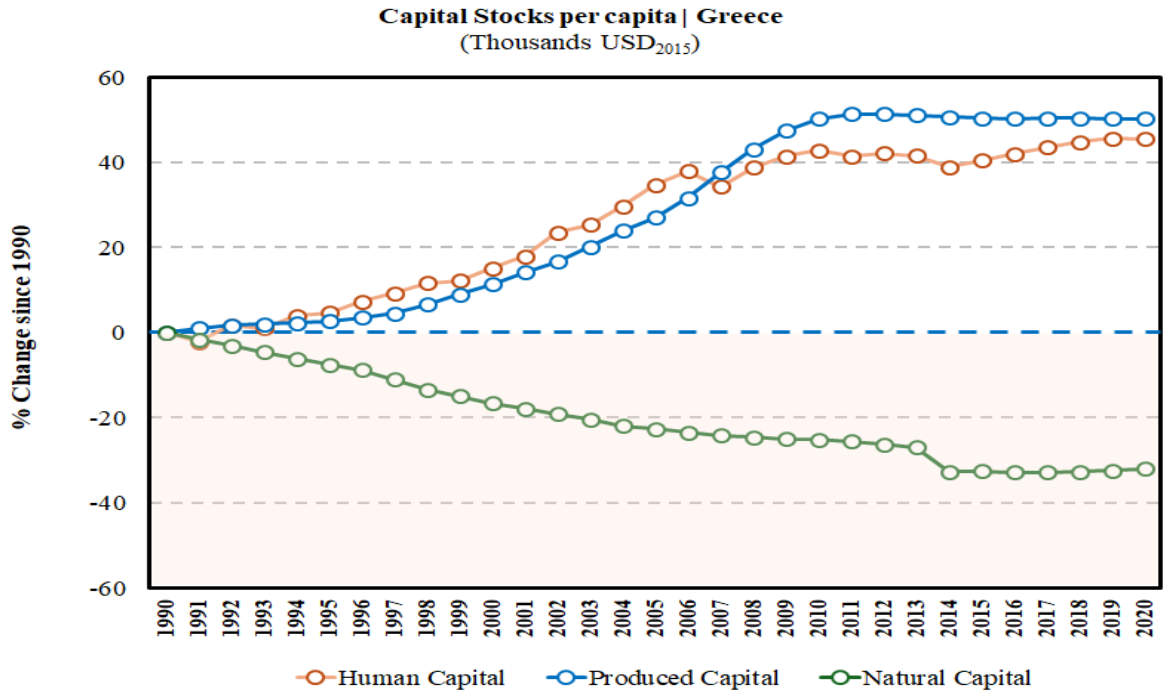

Figure 2. Trend of capital stock of human, produced and natural capital in Greece.

The implications based on the empirical results are straightforward: portfolios differ, so policy must too. For Greece, the priority is to lift human capital quality and returns (vocational/apprenticeships, modular digital/green skills, managerial capability) and to raise labour productivity via technology adoption, export-oriented clustering, and better firm-skill matching, sequenced with smart produced-capital investment. At the EU level, the use of average lines can act as accountability markers in order to target cohesion funds, from which countries can learn about best practices; moreover, it is important that policymakers manage natural capital as a strategic asset, especially where it offsets limited industrial scale. In essence, the right mix, not just bigger totals, drives resilient and inclusive prosperity.

5. Discussion and Policy implications for the inclusive wealth approach in Greece

Having in mind that the produced capital is increasing across the EU-28, this report aims to explore strategies to enhance the other two forms of capital: human and natural. For human capital, improvements can be achieved through (i) higher quality education and innovation, (ii)

expanded employment opportunities for skilled workers, (iii) addressing brain drain, and (iv) fostering trust in institutions and civic engagement. For natural capital, policy efforts should prioritize (i) sustainable management of land and forests, (ii) protection of marine and coastal ecosystems, (iii) circular economy practices and effective waste management, and (iv) incorporation of cultural and ecological heritage into decision-making.

5.1. Strategies to improve human capital in Greece

Strengthening Greece's human capital requires policies targeting education, employment, brain drain, and corruption. Enhancing tertiary education and innovation boosts labor productivity, while addressing geographic disparities ensures equitable access (Benos & Karagiannis, 2016; Verdis et al., 2019). Expanding skilled employment, especially for women, and promoting ICT skills counter "jobless growth" and labour market weaknesses (Bulman, 2020; Pappas et al., 2018; Tsiboukli & Efstratoglou, 2024). The brain drain, driven by limited domestic opportunities and institutional weaknesses, necessitates reintegration policies and incentives for returnees (Panagiotakopoulos, 2020; Theodoropoulos et al., 2014). Finally, combating corruption and building trust in institutions addresses human insecurity and supports SDG16 (Bitzenis et al., 2016; Halkos et al., 2025; Herzfeld, 2016). In Figure 3 the relevant strategies to improve human capital in Greece are presented.

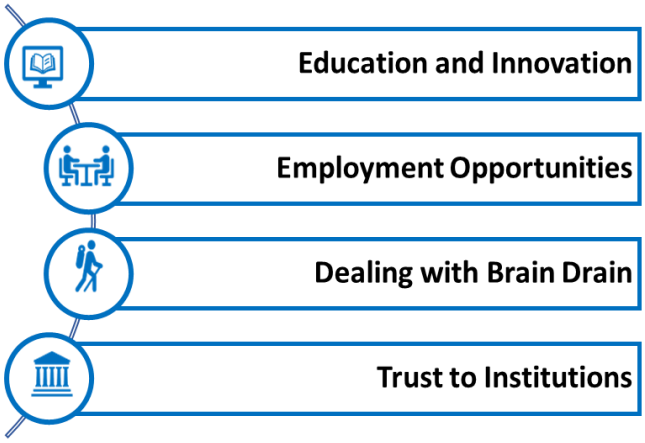

Figure 3. Strategies for the improvement of human capital in Greece

5.2. Strategies to improve natural capital in Greece

Strengthening Greece's natural capital requires sustainable forest and land management to protect biodiversity and restore degraded areas, supported by laws 998/1979 and 4280/2014 and community-based programs (Aslanidis et al., 2025; Evelpidou et al., 2021; Kalogiannidis et al., 2023; Spanos et al., 2021; Tzamtzis et al., 2023). Marine and coastal ecosystems are safeguarded through national laws aligned with the EU Water Framework Directive, marine protected areas, and pollution control, advancing SDG14 (European Parliament, 2000; Halkos, Zisiadou, et al., 2024). Circular economy policies, guided by the 2018 NSCE and the EU Circular Economy Action Plan, promote decarbonization and sustainable resource use, supported by digitalization and public engagement (Greek Ministry of Environment and Energy, 2018; Halkos & Aslanidis, 2024a, 2024b; Ioannidis et al., 2023; Trigkas et al., 2020). Integrating socio-cultural and ecosystem services in policies fosters conservation, eco-tourism, and inclusive economic development (Aslanidis et al., 2025; Gkargkavouzi & Halkos, 2025; Halkos, Koundouri, et al., 2024; Pavlidis et al., 2022; Sachs & Flanagan, 2022). In Figure 4 the relevant strategies to improve natural capital in Greece are presented.

Figure 4. Strategies for the improvement of natural capital in Greece

6. Conclusions

This report highlights Greece's inclusive wealth trajectory from 1990 to 2020, revealing critical gaps in human and natural capital despite growth in produced capital. Interestingly, human capital per capita remains nearly 46% below the EU-28 average, reflecting challenges in education, skills development, labour productivity, and brain drain. Additionally, natural capital faces pressures from biodiversity loss, deforestation, marine pollution, and limited circular economy adoption. Addressing these gaps requires integrated policies focused on higher education, innovation, employment opportunities, sustainable resource management, and the incorporation of socio-cultural and ecosystem values to promote inclusive economic development and societal resilience.

The present report showcases the need of adopting the Inclusive Wealth Index within a Beyond GDP framework, because it is crucial for Greece's long-term sustainability planning. Unlike GDP, the IWI captures the full spectrum of human, natural, and produced capital, providing a holistic measure of national wealth and wellbeing. Undoubtedly, incorporating IWI into policy design enables Greece to identify structural weaknesses, prioritize interventions, and align development strategies with intergenerational equity, SDGs, and global environmental commitments. To conclude, by leveraging the inclusive wealth framework, Greece can transform current challenges into opportunities for resilient and inclusive growth.

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