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A new pathway to sustainability: Integrating economic dimension (ECON) into ESG factors as (ECON-ESG) and aligned with sustainable development goals (SDGs)

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ABSTRACT

The concept of traditional ESG (Environmental, Social, Governance) factors is a sine qua non for sustainability and constitutes the cornerstones of a sustainable economy. However, although the inevitable impacts of economic activities on sustainability, it lacks the economic dimension (denotes ECON). Therefore, this study proposes to complete this missing leg, integrate economics into ESG, and obtain and introduce ECON-ESG as a composite sustainability concept. While ESG represents firm and microeconomics-based sustainability based only on environmental, social, and governance factors, ECON-ESG also incorporates the economy and represents sustainability, including macroeconomics affecting the firm's performance. Additionally, the linkage between ECON-ESG and SDGs will provide scholars with a composite form variable for use in sustainability models.

I. Introduction

Integrating Environmental, Social, and Governance (ESG) factors into sustainability has become essential to assessing a country's sustainable development pathways (Işık et al., 2024a, 2024b). However, ESG considerations mainly focus on firm-based, often lacking a direct linkage with economic fundamentals. Therefore, we transform this traditional three-component concept (ESG) into a four-component form by adding the "economics pilar" and making it ECON-ESG. This new form (concept) will fill the gap in the literature of studies that use ESG factors without considering the effects of economic metrics on sustainability.

This proposed form of sustainability can serve many of the purposes listed below for policymakers and scholars:

- Firm-based microeconomic ESG incorporates macroeconomic content with added macroeconomic indicators such as GDP, unemployment, and interest rates. Therefore, ECON-ESG factors may represent sustainability, including the economy, with the inevitable impact of macroeconomics since firms are directly affected by macroeconomic policies.
- Investors increasingly recognize the importance of economic sustainability alongside ESG considerations. Including economic factors into ESG and making it ECON-ESG will enhance its relevance to investors seeking to align their investments with both financial and sustainable development goals.
- ECON-ESG form will encourage policymakers to adopt policies that foster sustainable economic growth while addressing environmental and social challenges. This alignment promotes a balanced approach to policymaking that supports long-term prosperity and well-being.
- Economic stability is closely linked to overall sustainability. Assessing economic factors alongside ESG metrics will help identify potential risks and vulnerabilities, enabling stakeholders to implement proactive measures to mitigate economic, environmental, and social risks.
- Our proposed form, ECON-ESG, links the United Nations's sustainable development goals (SDGs) by using some selected indicators (shown in Table 1) of 232 SDG indicators. These selected indicators, such as CO2 emissions, control of corruption, and government effectiveness, correspond to the environment (E), social (S), and governance (G), respectively. Following these indicators, we add macroeconomic indicators (ECON) to ESG. This link between ECON-ESG and SDGs is necessary because the Sustainable Development Goals indicators are

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numerous and clearly defined. However, ESG factors are not clearly defined like SDG factors. Therefore, this link will enable us to integrate Sustainable Development Goals with ECON-ESG and have a holistic perspective on sustainability.

- This link will also enable us to question whether the results of empirical studies using the ECON-ESG form harmonize with the SDG factors within the framework of the used SDG indicators.
- The same link between ECON-ESG and SDGs will provide scholars with a composite form variable for use in sustainability models. Policymakers can leverage SDG indicators to identify areas where ESG factors can be incorporated into policy frameworks, leading to more holistic and effective policy solutions.
- The same link may improve accountability and reporting mechanisms to measure progress; policymakers can enhance transparency and accountability in monitoring the effectiveness of policies and initiatives promoting sustainability.

2. Literature Review

Various studies incorporate recommendations from ESG analysis reports provided by asset managers and rating agencies when constructing the composite ESG index (Capelle-Blancard et al., 2019; Diaye et al., 2022; Işık et al., 2024a, 2024b). These reports are from various entities such as VIGEO (2013), HSBC AM (2013), Natixis AM (2013), MSCI, ESG Research (2011), and the emerging market debt team at Neuberger Berman (2014). Despite their comprehensive coverage, concerns persist regarding the reliability and uniformity of these ratings (Chatterji et al., 2009). Many ESG ratings focus on evaluating policies and occasionally superficial actions rather than quantifying actual reductions in environmental or social impacts and associated risks (Gonenc and Scholtens, 2017).

3. Indicators Used for ESG Factors

Işık et al. (2024a, 2024b), Diaye et al. (2022), and Capelle-Blancard et al. (2019) have underscored the extensive range of factors utilized in computing Environmental, Social, and Governance (ESG) indices. Environmental metrics encompass considerations such as air quality, water resources, forest conservation, and the integration of renewable energy sources. Social indicators encompass human capital development, demographic dynamics, healthcare provisions, employment dynamics, and efforts towards gender equality. Governance criteria commonly include evaluations of democratic institutions and the implementation of policies aimed at ensuring safety and effective governance. Table 1 describes the detailed explanation of individual ESG factors.

Table 1 Measuring ESG Indicators

Dimension	Measuring Items
Environmental	Renewable energy consumption
	Combustible renewable energy (% of total energy)
	Renewable electricity output
	Forest area
	Control air pollution (CO2 emissions, Methane emissions, Nitrous oxide emission)
	Natural resources depletion
	Access to clean fuels and technologies for cooking
	Waste water treatment
Social	School enrollment secondary
	Health expenditure, public
	Life expectancy
	Population density
	Female to male Ratio
	Gender parity index
	Non-vulnerable employment
Governance	Control of corruption
	Regulatory quality
	Rule of law
	Government effectiveness
	Political stability and absence of violence/terrorism

4. Indicators Used for Economic Factors

The traditional ESG framework provides valuable perspectives on environmental stewardship, social responsibility, and governance practices. However, it tends to neglect the direct influence of economic factors on sustainability outcomes at the national level. Economic performance, encompassing indicators like GDP growth, unemployment rates, and income distribution, significantly shapes a country's capacity to tackle environmental issues, foster social equity, and maintain effective governance standards. Yet, the existing gap between economic factors and ESG metrics hampers policymakers' and stakeholders' capacity to devise efficient strategies for sustainable development and inclusive growth. Although various other factors have both direct and indirect connections to the economy, Table 2 outlines the proposed economic indicators, which are vital measures for evaluating the performance of the economy (Işık et al., 2024a, 2024b; Jain and Singhal, 2023; Korkmaz et al., 2022; Thomas Ng et al., 2000; Landefeld et al., 2008; Kosarev and Ponomarenko, 1996; Zarnowitz & Braun, 1989; Cain, 1979).

Table 2 Measuring Economic Indicators

Dimension	Measuring Items
Economic Variables	Gross domestic product
	Interest rate
	Consumer price index
	Foreign exchange rate
	Unemployment rate

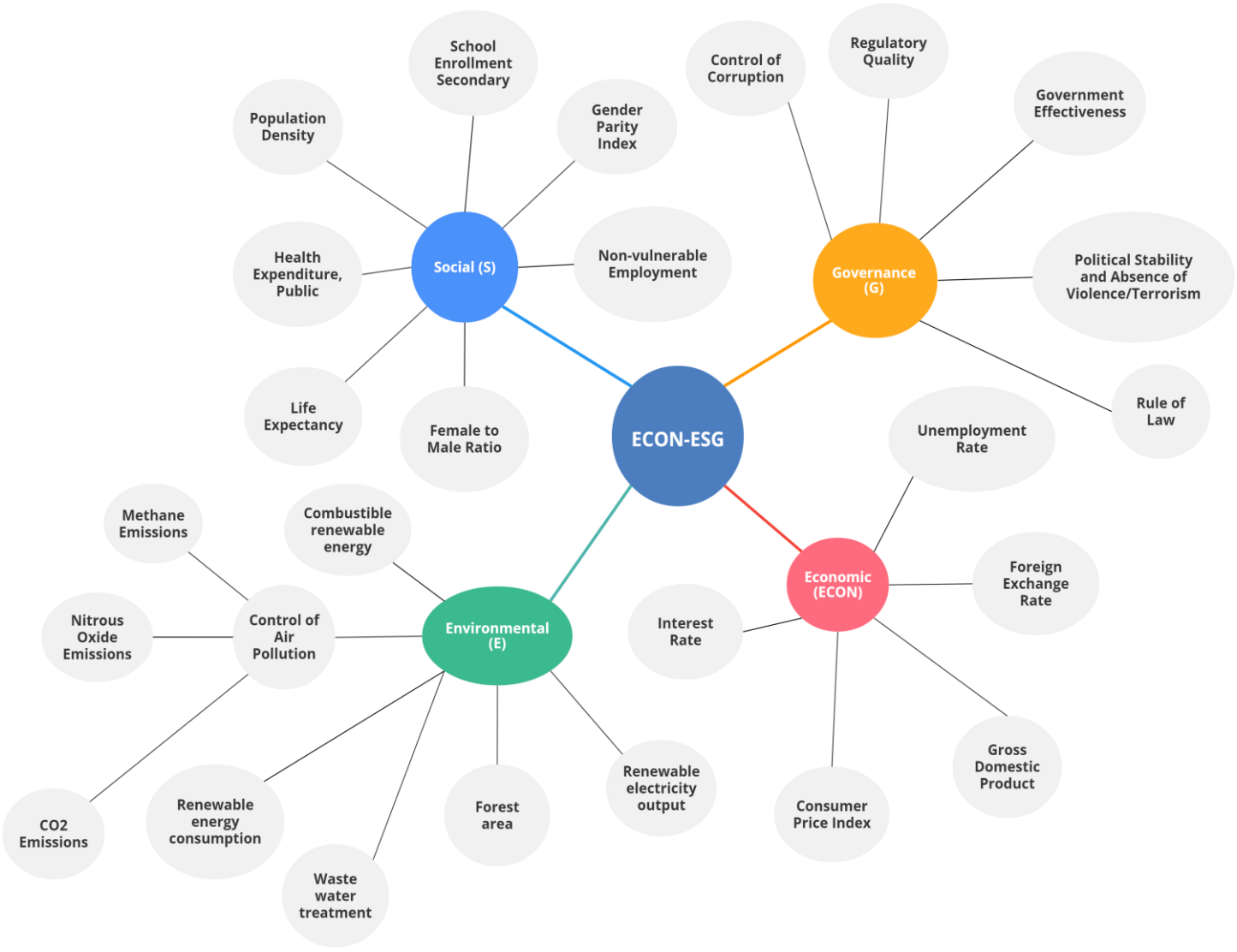

Figure 1 Integrating economic dimension (ECON) into ESG factors as (ECON-ESG)

Each of these economic variables/indicators is considered crucial for understanding various aspects of economic health. Gross Domestic Product (GDP) is a comprehensive measure of a country's economic activity, reflecting overall growth and productivity. Interest rates influence borrowing, saving, and investment decisions, impacting consumer spending and inflation rates. The Consumer Price Index (CPI) tracks changes in the cost of living, providing insights into inflationary pressures. Foreign Exchange Rates affect international trade competitiveness and capital flows, influencing export/import dynamics and inflation. The Unemployment Rate indicates labor market conditions and economic resilience, reflecting the availability of jobs and consumer confidence. Monitoring these variables collectively provides a holistic view of economic performance, aiding policymakers, businesses, and investors in decision-making and risk management.

5. Methodology

The methodology of the proposed composite ECON-ESG framework (see Figure 1) is constructed using individual economic (ECON), environmental (E), social (S), governance (G), and ECON-ESG indices in the following procedural steps:

Principal Component Analysis: Principal Component Analysis (PCA) is a statistical method that identifies coherent subsets of variables in a dataset by combining highly correlated variables into components. These components reveal underlying processes that explain the association among the variables (Tabachnick et al., 2007). PCA aims to extract maximum variance from the dataset, with each component representing a linear combination of observed variables that maximally separates subjects by maximizing the variance of their component scores. Subsequent components are computed from residual correlations to extract maximum variability. The variability captured by subsequent components in PCA is uncorrelated with the first component, ensuring independence. These subsequent components also extract maximum variability from residual correlations and remain independent from each other. As a result, the extracted components represent a significant portion of the variance in the original dataset and can be utilized in further analysis. Creating an ECON-ESG form principal component analysis can be an appropriate method. We propose a new dimension that is vital to the country's sustainable development.

The PCA procedure in this study, shown in Figure 2 involves these key stages:

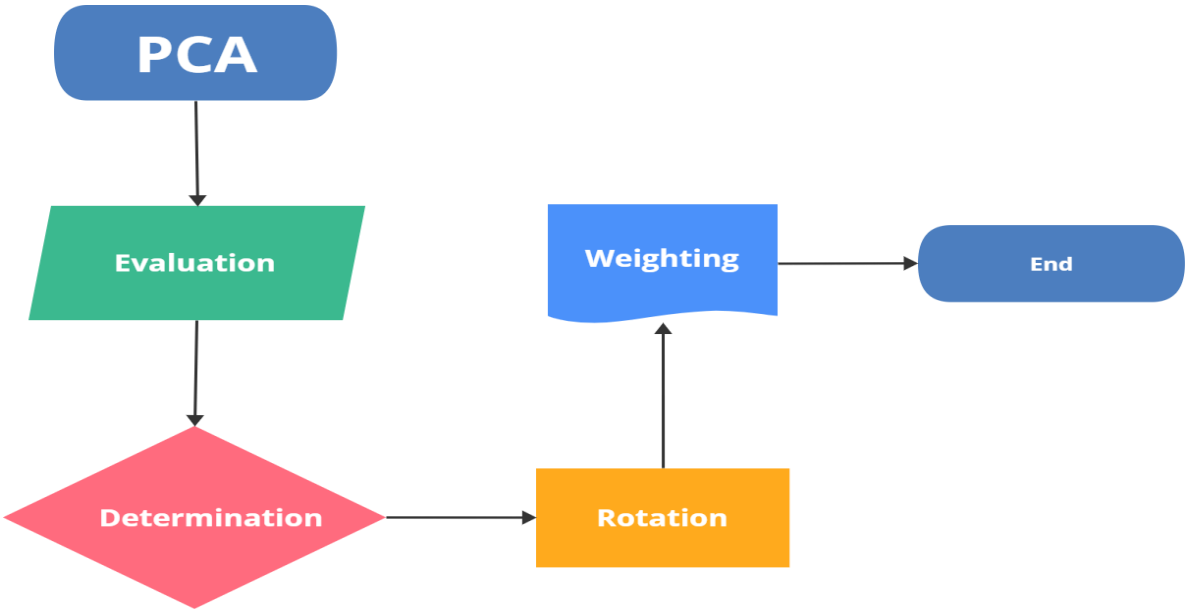

Figure 2 PCA Calculation Stage

- *Evaluation*: Evaluating variable relationships using the Kaiser-Meyer-Olkin (KMO) measure, with a threshold KMO statistic of 0.6, to proceed with factor analysis (Kaiser and Rice, 1974). This measure assesses how well-suited the variables are for factor analysis by comparing the sum of squared correlations to the sum of squared partial correlations.
- *Determination*: Determining the number of factors needed and their calculation through PCA. Factors are coefficients (loadings) that measure correlations between individual indicators and latent factors. PCA forms linear combinations of fundamental indicators, with the first principal component capturing the highest variance in the sample, followed by successive components explaining smaller portions of variance and being uncorrelated with each other.
- *Rotation*: Rotating factors to simplify interpretation. Factor rotation is a standard step in factor analysis aimed at reducing indeterminacy in results. The varimax method, employed here, minimizes the number of variables with high loadings on the same factor, thereby approximating a "simple structure" where each indicator predominantly loads on one retained factor. This enhances factor interpretability.
- *Weighting*: Constructing weights for summary indicators based on factor loadings and their contribution to explained variance. Detailed indicators are weighted according to the proportion of variance explained by associated factors (normalized squared loading). In contrast, factors are weighted based on their contribution to the explained variance in the dataset (normalized sum of squared loadings).

6. Conclusion

In conclusion, the integration of Environmental, Social, and Governance (ESG) factors has become integral to assessing countries' sustainable development trajectories. However, traditional ESG frameworks often lack a direct link to economic fundamentals. Recognizing this gap, the concept of "ECON-ESG" has been proposed, aiming to enhance sustainability assessment by incorporating economic indicators alongside traditional ESG metrics.

While ESG analysis reports from various sources provide valuable insights, concerns remain regarding their reliability and uniformity. Moreover, existing ESG indices primarily focus on evaluating policies rather than quantifying actual environmental and social impacts. This paper proposes a comprehensive approach to ESG assessment, utilizing a wide range of environmental, social, and governance indicators. Additionally, it introduces economic variables such as GDP, interest rates, and unemployment rates into the assessment framework. Principal Component Analysis (PCA) is suggested as an appropriate method for creating the ECON-ESG form. This involves evaluating variable relationships, determining the number of factors, rotating factors for interpretation, and weighting factors based on their contribution to explained variance.

Incorporating economic indicators into ESG and making it ECON-ESG form provides a more holistic understanding of countries' sustainability and development efforts. It enables policymakers, businesses, and investors to make informed decisions and devise efficient strategies for sustainable growth and inclusive development.

6.1 Future Gap and Limitations

The difficulty of ensuring the reliability and consistency of ESG indicators in the process of integrating economic indicators into ESG is a limitation of this proposed ECON-ESG form. Because this potential limitation may affect the accuracy of sustainability assessments. Therefore, future research should focus on refining methodologies for ECON-ESG assessment and exploring alternative statistical techniques and data sources to enhance accuracy and reliability. Additionally, efforts to standardize ESG indicators that will be used with high representative power and standard reporting techniques are crucial for more accurate and comparable empirical results with other studies in the literature. Empirical studies using long-time series are needed to understand the long-term impact of ECON-ESG on sustainability outcomes and economic performance. At the same time, integration with emerging trends such as climate change and technological innovation should be prioritized to ensure the framework remains relevant and effective in guiding decision-making. Because new technological developments such as AI are coming into use rapidly and widely and are starting to change many things, from the economy to the environment and social life.

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