I3E Economic Uncertainty Index

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Abstract

We outline the methodology employed in the construction of national and global I3E Economic Uncertainty Indexes. The I3E is a composite indicator designed to quantify the level of economic uncertainty across countries by synthesizing information from four key financial market variables: equity index prices, 10-year government bond prices, exchange rates, and Brent crude oil prices. Each national I3E index aggregates these variables into a single synthetic measure of uncertainty specific to a country's macro-financial environment. The I3E global index is then derived as a GDP-weighted average of the national indexes.

Keywords: Economic uncertainty; Economic index; I3E.

1.   Measuring Economic Uncertainty

Economic uncertainty plays a critical role in macroeconomic outcomes, influencing growth, investment, and policy responses. The measurement of economic uncertainty is pivotal for understanding its macroeconomic effects.

A number of uncertainty indices and empirical approaches have emerged in the last years, each tailored to specific data sources, country coverage, or theoretical underpinnings. These include text-based indices such as the World Uncertainty Index (WUI) (Ahir et al., 2022) and Economic Policy Uncertainty (EPU) (Baker et al., 2016), and statistical measures of variance (Lensink et al., 1999), often derived from autoregressive models or GARCH frameworks.

Volatility indexes like the VIX measuring the expected 30-day volatility implied by stock index option prices like the S&P500 and published by the Chicago Board Options Exchange (CBOE) since 1990 are also frequently used as a measure of financial uncertainty (Whaley, 2009).

We introduce the I3E as an alternative index designed to measure uncertainty. A key advantage of the I3E lies in its ability to be computed efficiently on a daily basis using standardized, publicly available national financial data. This reliance on widely accessible and comparable inputs facilitates consistent cross-country analysis of economic uncertainty. The index values are theoretically bounded between 0 and 200, thereby enabling meaningful comparisons over time and across national economies.

2.   I3E Economic Uncertainty Index

The IESE Economic Uncertainty Index (I3E) is constructed using the daily closing prices of four financial variables for each of the countries covered:

- Domestic equity index

- Domestic 10-year government bond price

- Domestic exchange rate

- International Brent crude oil price

Daily growth rates (or returns) of these four economic-financial series are calculated as:

$$y_i(t) = \frac{x_i(t) - x_i(t-1)}{x_i(t-1)}, \quad \text{for } i = 1, 2, 3, 4$$

Next, the volatility of each series is calculated using exponential smoothing (alpha = 0.05) of the squared returns $y_1(t), y_2(t), y_3(t), y_4(t)$:

$$z_i(t) \quad \text{for } i = 1, 2, 3, 4$$

This is the method followed by J.P. Morgan (Riskmetrics) to compute volatilities.

Since the resulting series are right-skewed, their natural logarithms are taken. We define:

$$w_i(t) = \log(z_i(t))$$

for $i = 1, 2, 3, 4$

For the normalization, let μ_i and σ_i be the mean and standard deviation of $w_i(t)$ over the period 2014-2024. The standardized values are:

$$s_i(t) = \frac{w_i(t) - \mu_i}{\sigma_i}$$

The composite standardized series is:

$$S(t) = \sum_{i=1}^{4} \frac{w_i(t) - \mu_i}{\sigma_i}$$

Its standard deviation σ is:

$$\sigma = \sqrt{4 + 2\sum_{i<j} \rho_{ij}}$$

where ρ_{ij} is the correlation between $w_i(t)$ and $w_j(t)$.

The I3E uncertainty index for a country at time t is then defined as:

$$I(t) = 100 + \frac{30}{\sigma} \sum_{i=1}^{4} \frac{w_i(t) - \mu_i}{\sigma_i}$$

For the reference period, $\sigma \approx 3$.

Using the above formula the I3E for each country can be computed using daily data

for the four financial variables. Information about the index daily values and historical data can be downloaded from I3E Index.[1]

3. Global I3E

The I3E Global is a weighted sum of all available national indexes. Let $I3E_i(t)$ be the value of the index for country i at time t, then the I3E global is computed as:

$$I3E_{global}(t) = \frac{\sum_{i=1}^{n} w_i \times I3E_i(t)}{\sum_{i=1}^{n} w_i}$$

where n is the number of countries and w_i is the nominal GDP in US dollars of country i.

Figure 1 shows the evolution of the I3E Global from 2014 to 2025 using the 22 largest economies where the required data is readily available: *Australia, Austria, Belgium, Brazil, Canada, China, Egypt, France, Germany, Greece, Israel, Italy, Japan, Mexico, Netherlands, Poland, South Africa, South Korea, Spain, Turkey, UK, USA.*

References

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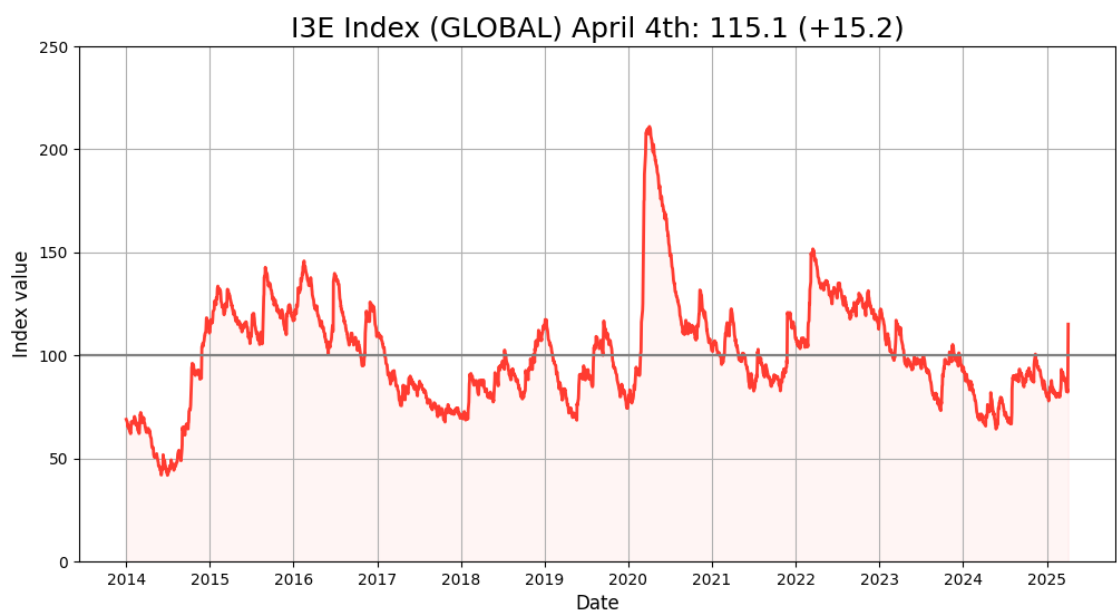
[1]Additional information about the I3E Spain: https://blog.iese.edu/icdm/que-es-el-i3e/

Figure 1: I3E global index