

Country Susceptibility Modeling

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As beneficial nuclear and radiological technologies spread throughout the world, they create targets for non-state actors to carry out malicious attacks or gain valuable country level assets. In order to assess the relative potential for such an event to occur in a country, a multi-objective decision analysis model was developed. One piece of that model considers how susceptible a population is to radicalization.

Problem Statement

How susceptible is a country's population to radicalization?

Answering this question relies on understanding the underlying characteristics within a country that may increase a population's sense of marginalization or discontent. [1]

MODA

A multiple objective decision analysis (MODA) is a structured approach to making informed decisions. Complex problems are broken down into a set of smaller problems that can be managed easily. After assessing each smaller problem, MODA provides a formal mechanism to combine the information and make a decision. [2] MODA is most often used in decision and risk analysis when there are multiple objectives, usually in conflict, that require quantifying explicit value tradeoffs.

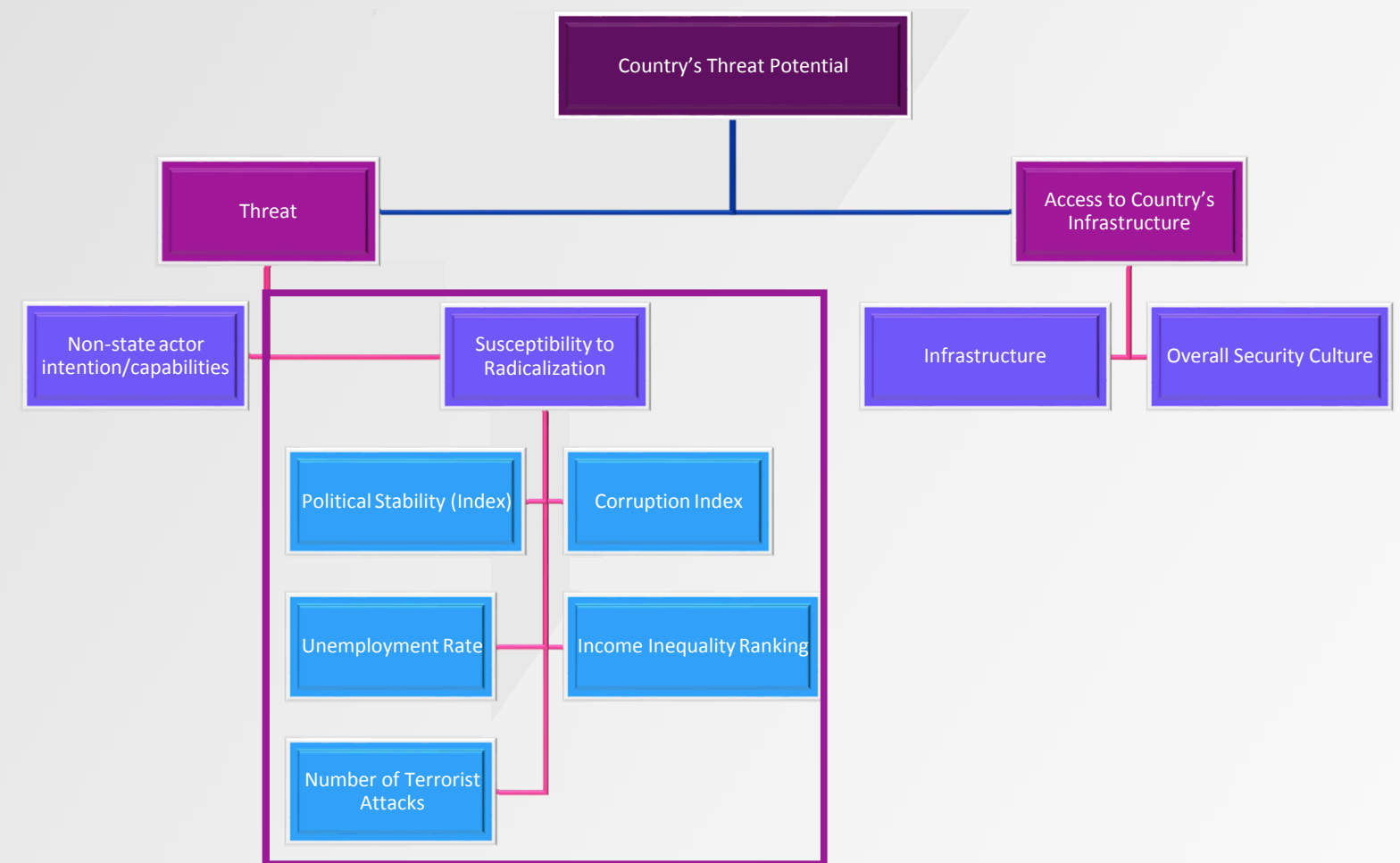


Figure 1: MODA Flow Chart for Country Susceptibility

Susceptibility Scoring

Factors that influence susceptibility are shown in Figure 1. To evaluate a country's susceptibility, data has been gathered from many open sources in order to characterize a country. Examples include GINI Index, Unemployment, Vulnerable Population, and Corruption Perception Index. Weights, which would be derived from subject-matter experts (SMEs), are compounded against the scaled data to rank the countries as accurately as possible.

$$Objective = \sum_{i=1}^n Weight_i * Value_i$$

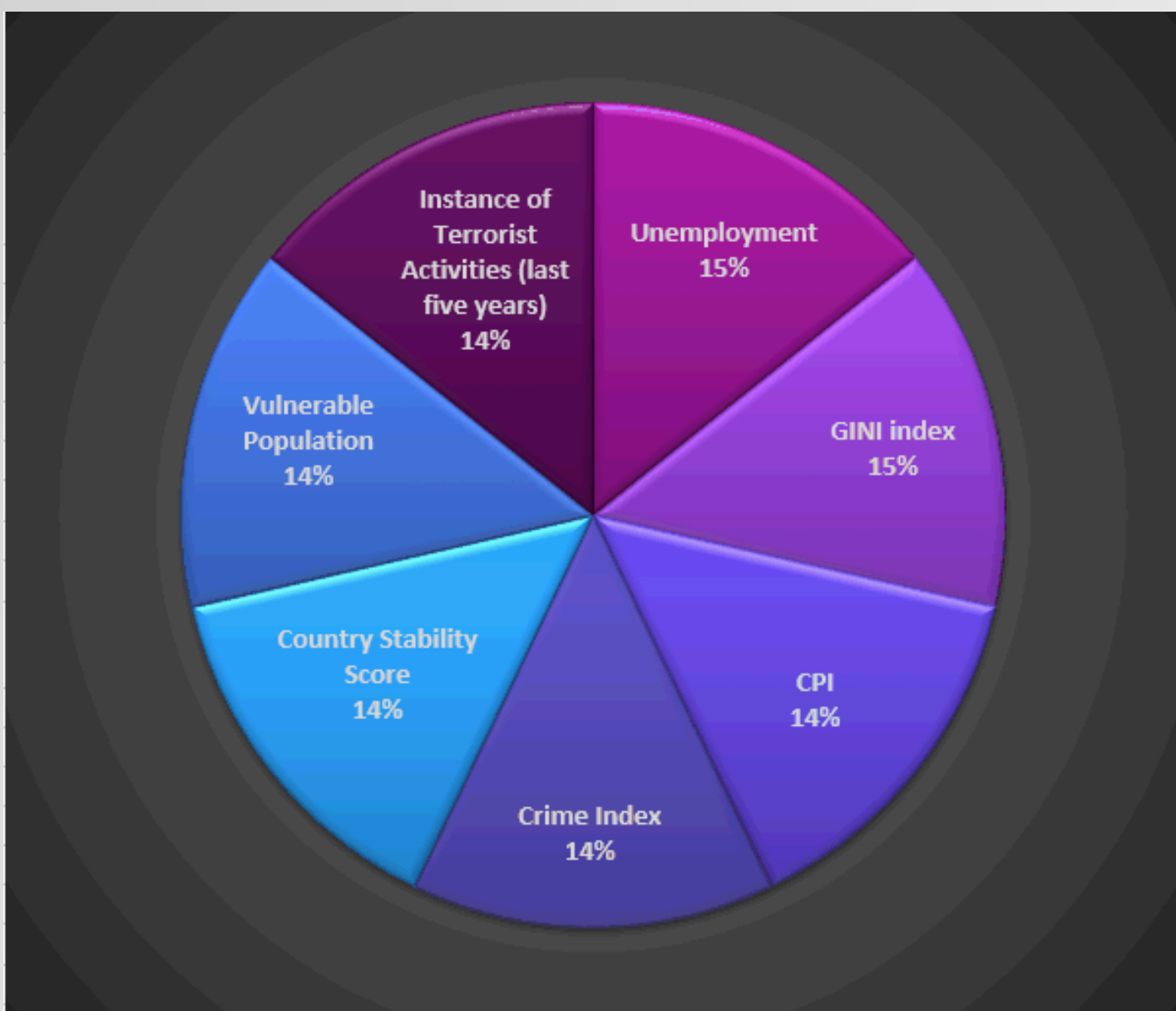


Figure 2: Example Country Susceptibility Scoring Using Equal Weights

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Database Creation

To facilitate the ease-of-use and access of the data to be used by the sponsor, a SQL server was established. Schema were developed to model the data in a relational way. Scripts written with queries inside allow users to view specific data from the database in a readable form.



Example MODA with Variation of Weights

Illustrative variation of weights highlights model outputs under alternative weighting structures.

Country Susceptibility Scoring

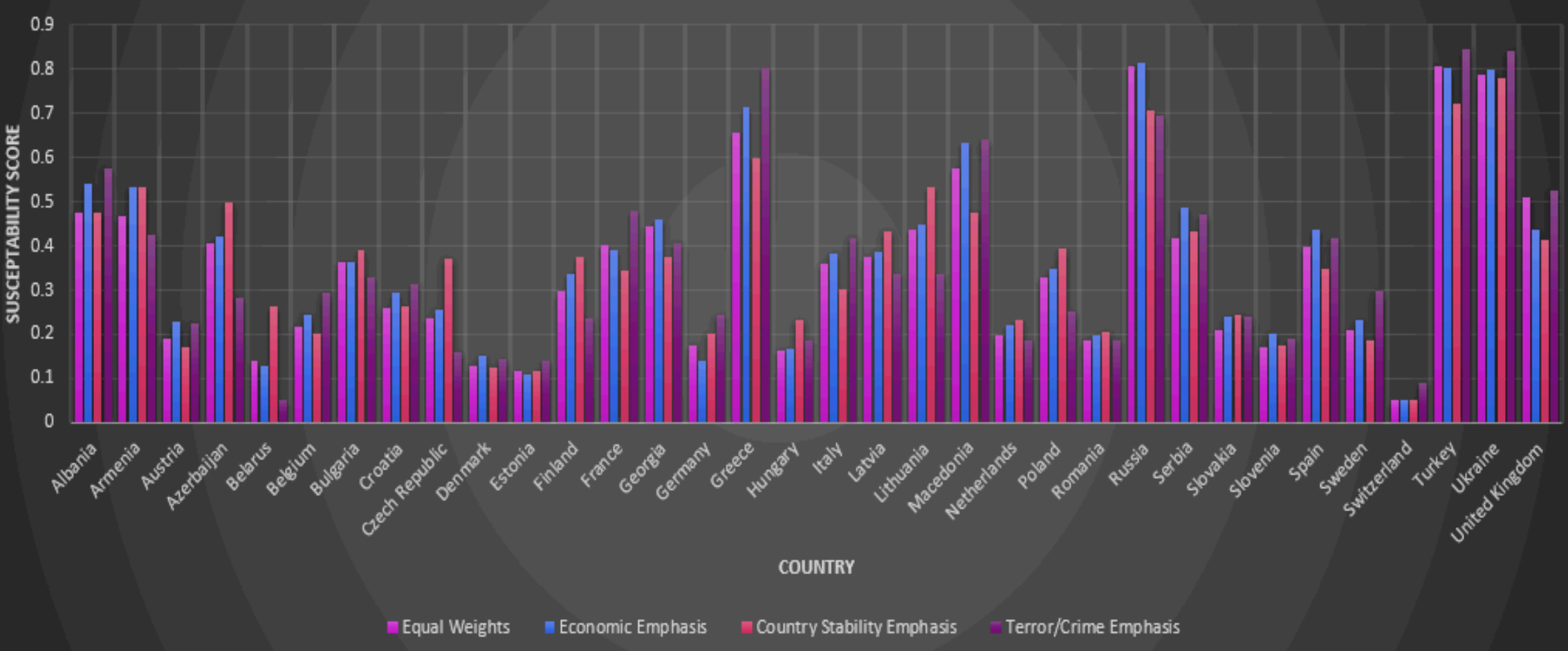


Figure 4. Country Susceptibility Four Scenario Bar Chart

Country Susceptibility Scoring

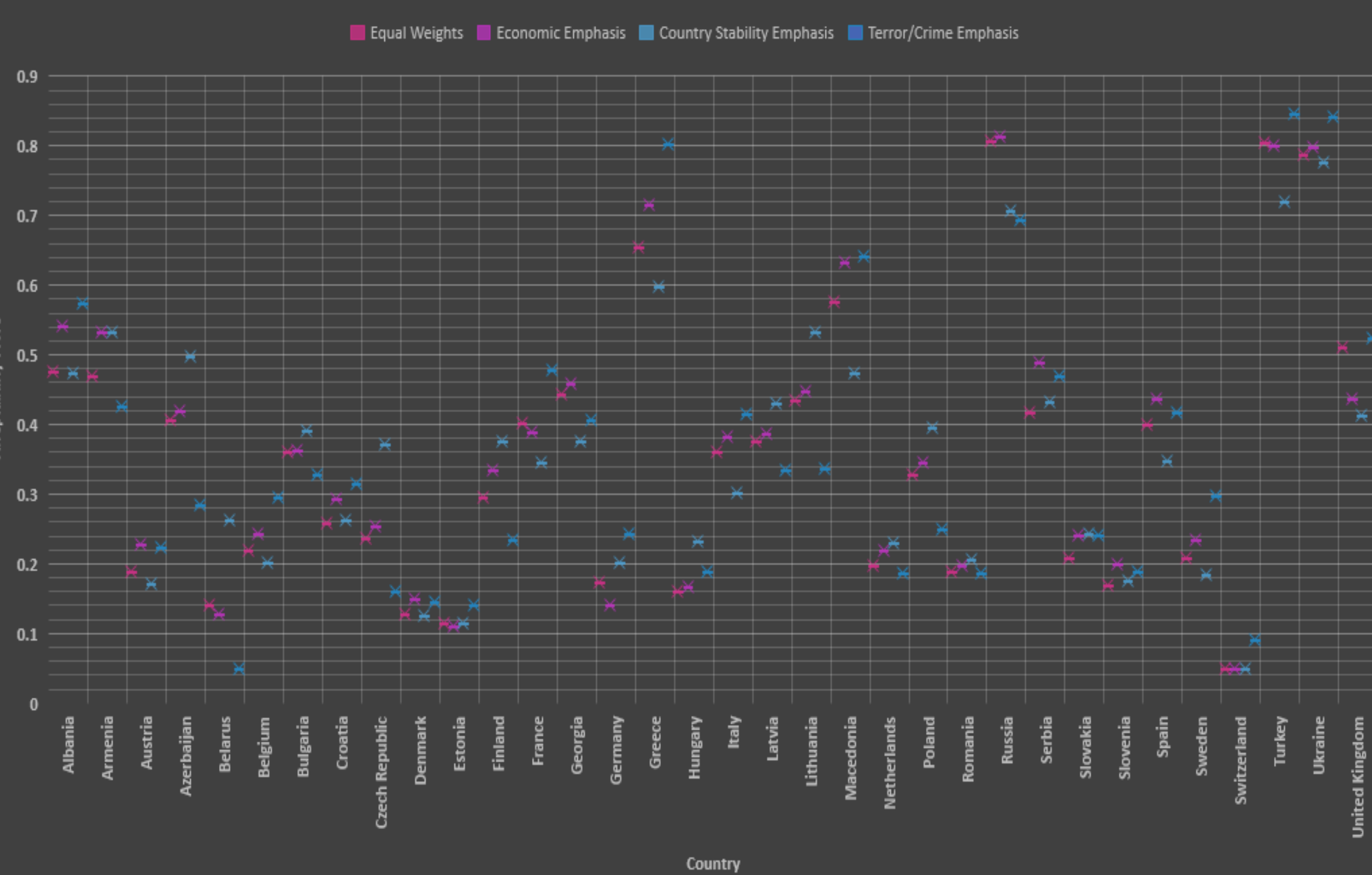


Figure 5. Country Susceptibility Four Scenario Plot

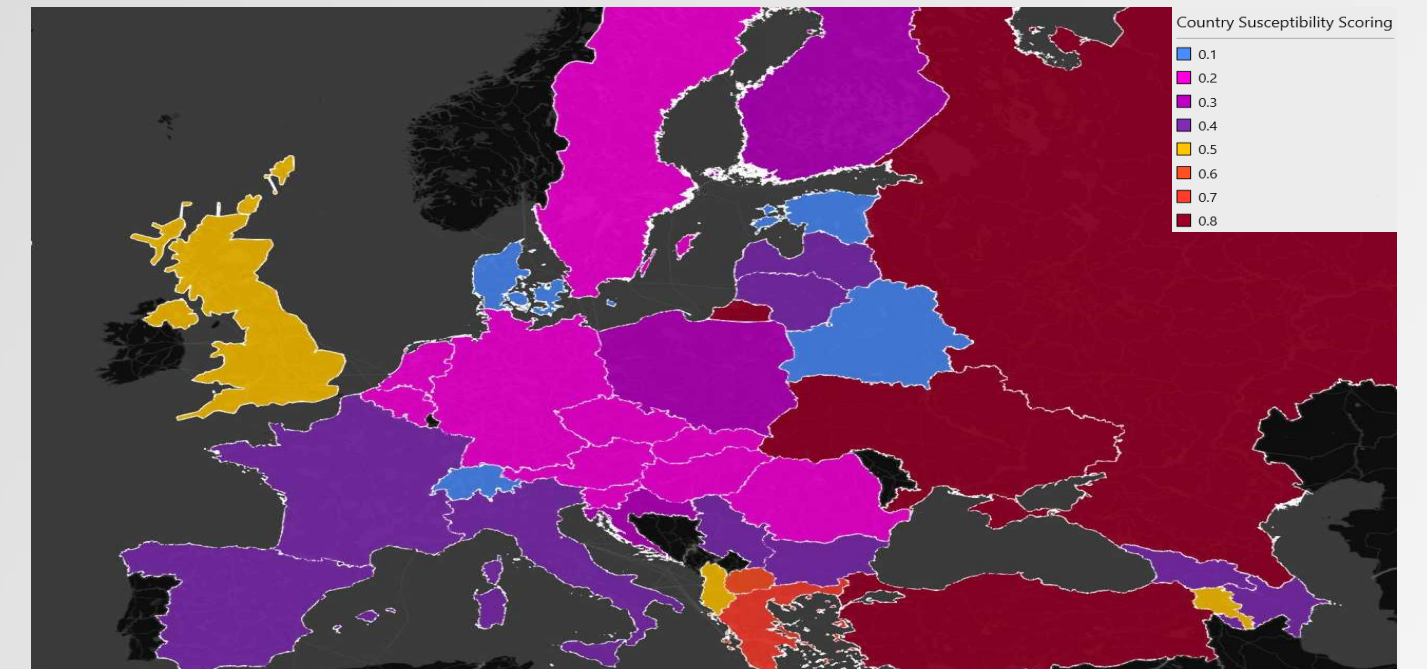


Figure 6. Equal Weights

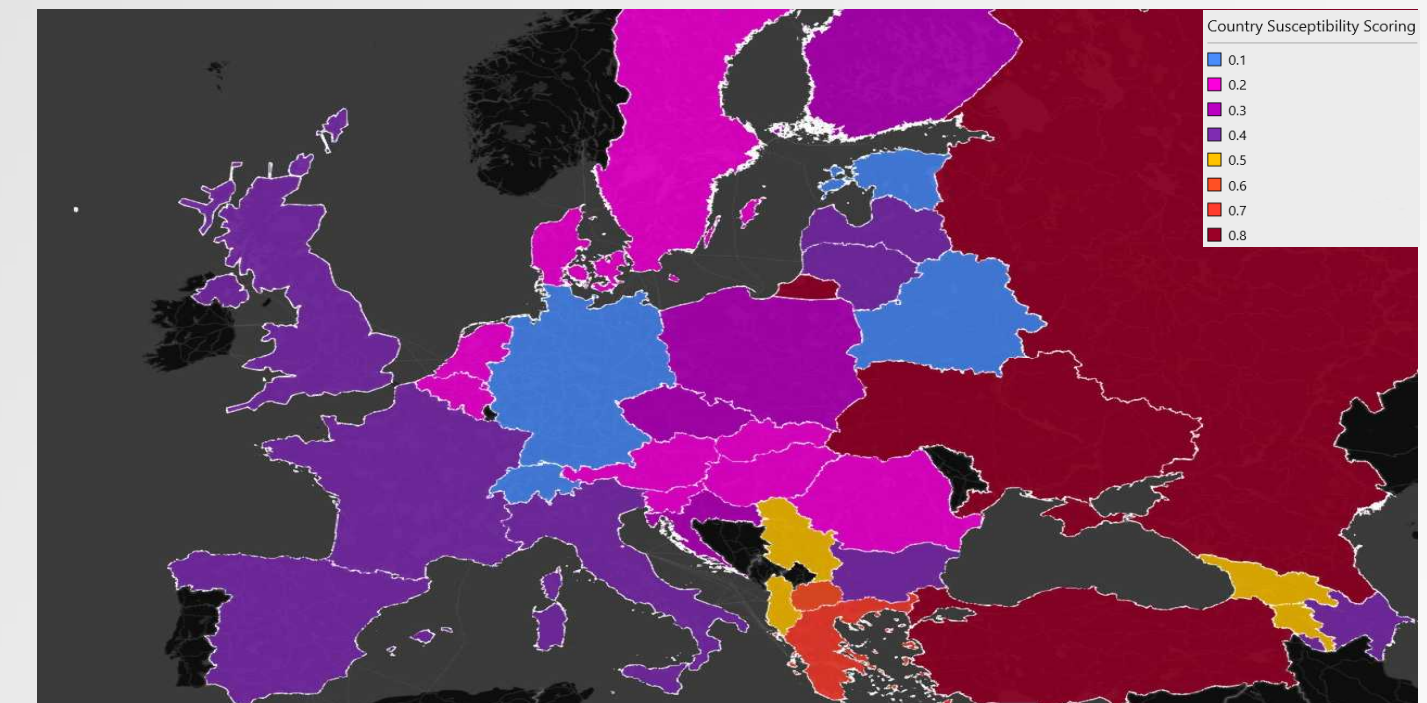


Figure 7. Economic Emphasis

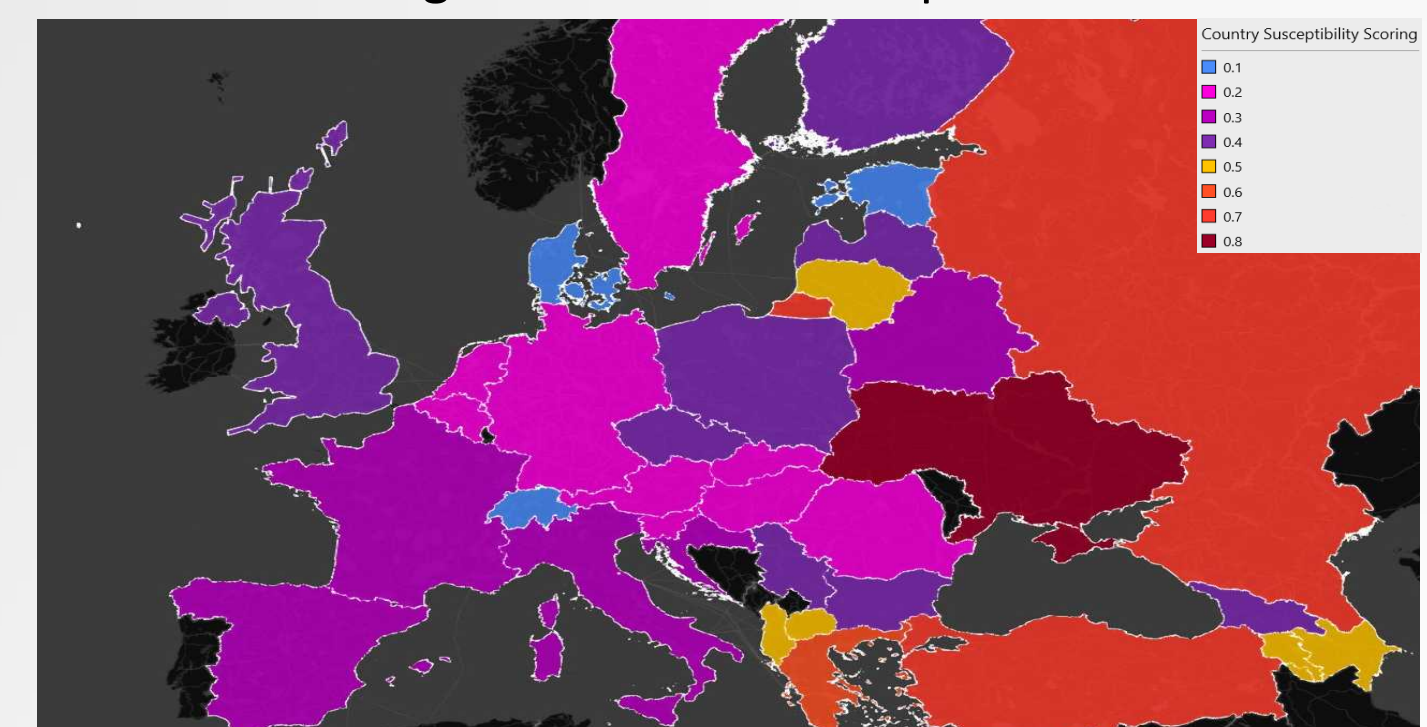


Figure 8. Country Stability Emphasis

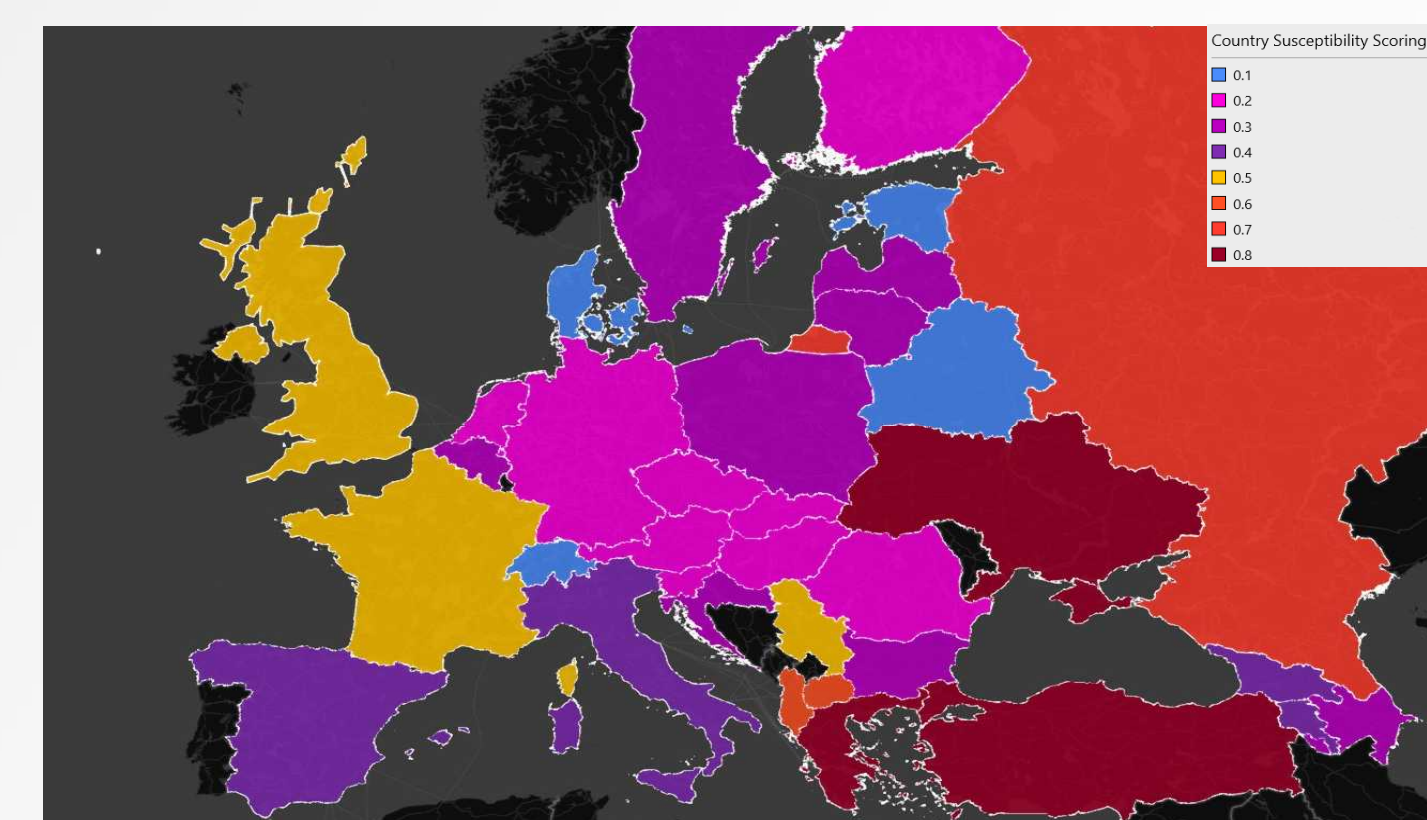


Figure 9. Terror/Crime Emphasis

References

1. Fishman, Shira. 2010. "Community-Level Indicators of Radicalization: A Data and Methods Task Force." *Report to Human Factors / Behavioral Sciences Division, Science and Technology Directorate, U.S. Department of Homeland Security.* (February): www.start.umd.edu/pubs/START_HFD_CommRadReport.pdf
2. Brownley, Clinton W. *Multi-objective Decision Analysis Managing Trade-offs and Uncertainty.* New York, NY: Business Expert, 2013. Web.